SCIENTIFIC AMERICAN

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THE NEBRASKA CITY PONTOON BRIDGE.

We illustrate in the present issue a new bridge recently completed, which crosses the Missouri River at Nebraska City, Neb. The bridge is of a type that has been but little used, except for military purposes. It consists of a flooring carried by a substructure which floats upon the river. A similar bridge across the Rhine, between Coblentz and Ehrenbreitstein, will be remembered by our readers, where the floor is carried by a series of boats or pontoons. A pontoon bridge is also in use across the Mississippi River at Prairie du Chien. In military operations pontoon bridges, from their portability, and on account of the rapidity with which they can be put together, have acquired much importance, and have figured in nearly all the important wars of modern times.

Nebraska City had held a franchise for twelve years for the construction of a pontoon bridge. All movements in the direction of carrying on the work met with the inevitable objections of those interested in steamboats plying on the river. Many predicted that it would be impossible to construct it. The Missouri River, noted for its swift current, at this point attains about its highest velocity. The river carries with it many floating logs and trees, which alone would seem to make the maintenance of such a structure impossible.

The river at this point has two arms. Over one of them a permanent cribwork bridge passes, having a total length of 1,050 feet. Where it stops the pontoon bridge begins, and reaches across the main river, with a length of 1,074 feet. As will be seen from the cut, the bridge is angular or V-shaped. The point or apex of the angle points down stream. When it is necessary to open the draw, the connections at the apex are loosened and the current at once swings the two members apart, leaving an unobstructed channel of 528 feet in width. In this feature it is the largest drawbridge in the world. When it is desired to close it, the ends of the draw members are brought together, the current being made to do most of the work. The entire operation can be managed by one man.

This is in strong contrast to other structures of the same character. The draw in the Prairie du Chien structure alluded to above requires a powerful engine to close it.

The bridge is divided into a roadway for vehicles and two side paths for foot travelers. The roadway is sixteen feet wide. On one side is a three-foot sidewalk, and on the other side one of five and one-half feet width. This gives a total width of twenty-four and one-half feet.

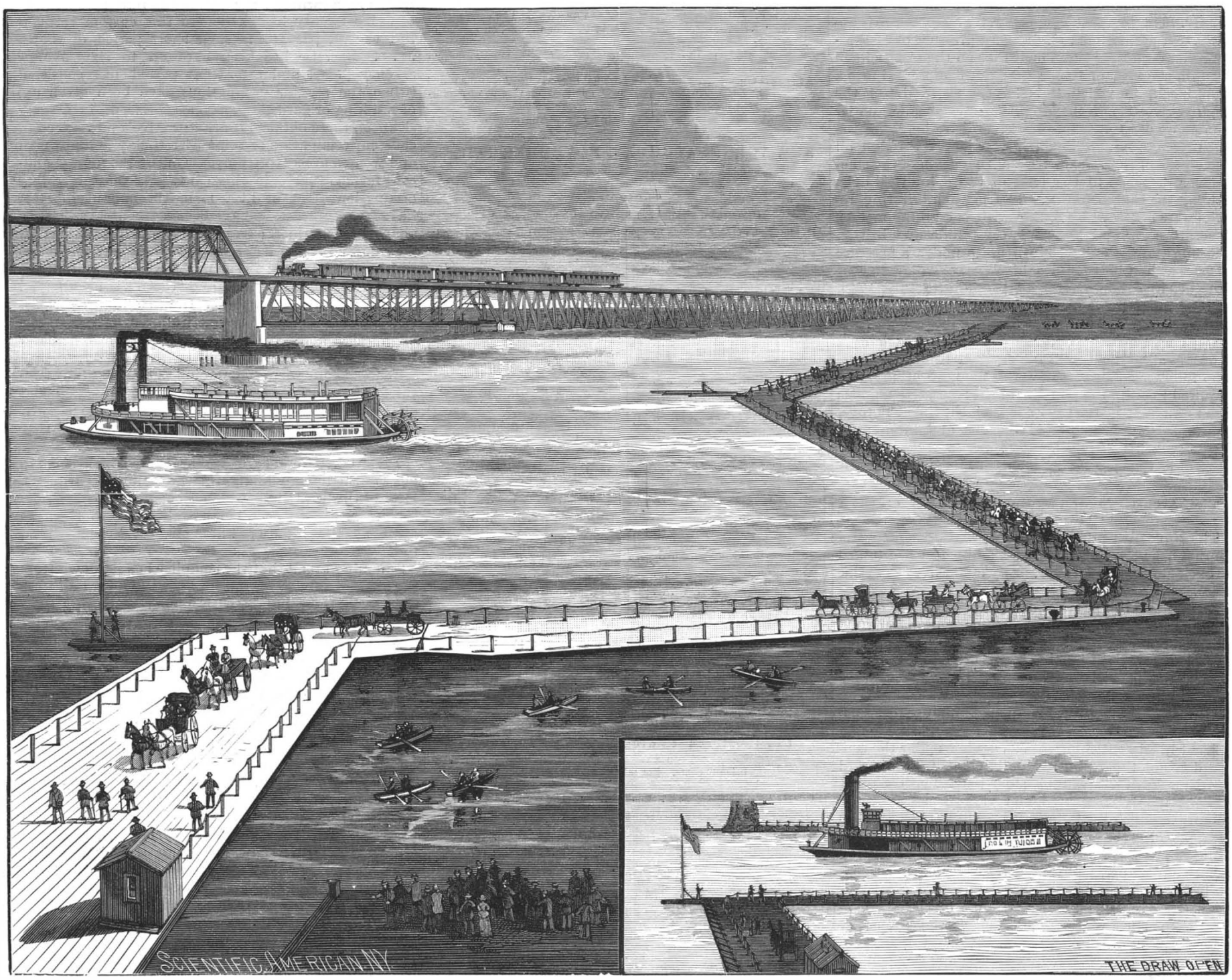
The floats are anchored by a very perfect system, and one which, it is believed, will stand every condition the structure is likely to be exposed to. When it was in process of building, the water was within two feet of high water mark, and the river swept down many logs and trees of great size. Numbers were carried by the current under the boats without any bad effects. For the spring floods it is proposed to greatly increase the strength of the steel anchoring cables. The bows of the boats are to be sheathed with iron and the bottoms are to receive an extra planking of oak. It is considered certain that the rapid current will sweep all obstacles under the boats. It is proposed to remove the bridge when ice forms on the river.

The object of arranging the draw in the peculiar shape shown was to facilitate closing. The government, in granting the charter, had stipulated for so wide an opening that it seemed doubtful if a pontoon could be closed at right angles to the axis of the stream.

Both the pontoon and crib bridges were built within the short space of twenty-eight days, at a cost of about $18,000. Col. S. N. Stewart, of Philadelphia, was the constructing engineer.

In the background is shown a second bridge, built for the use of the railroads. This also is a recently completed structure. It was built by the Union Bridge Works. It is of steel throughout. The caissons were sunk in December, 1887, and January and February of this year. The first piece of metal was put in position February 13, and on June 8 the last piece was in place. The through spans are 400 feet, the deck span 325 feet long. The entire length of the bridge is 1,128 feet and its weight is 1,489 tons. The stone piers are 85 feet high and are 18 by 46 feet area at their bases.

The pontoon bridge has proved so successful that it has been proposed to form a company for the construction of pontoon bridges across the Missouri River,



THE GREAT PONTOON DRAW BRIDGE OVER THE MISSOURI RIVER, AT NEBRASKA CITY.

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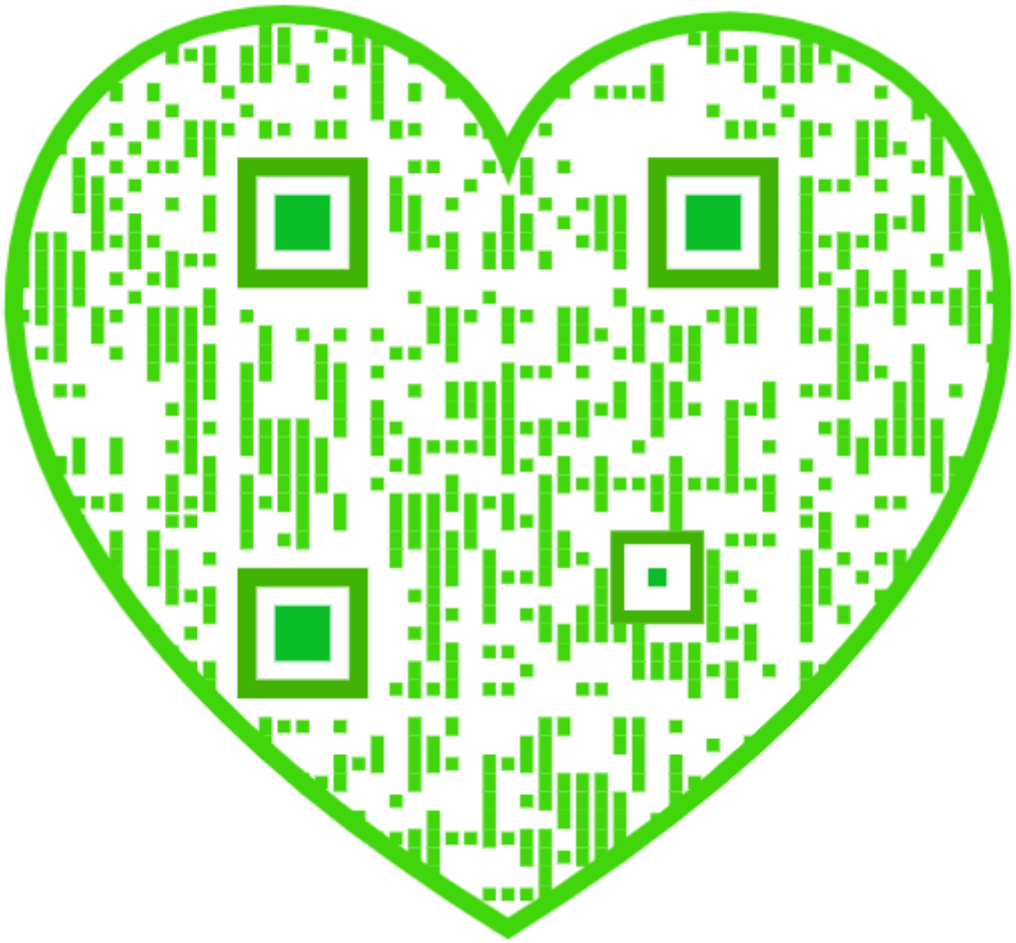

Certainly, from considerations of cheapness and practicability, they would seem to leave little to be desired. The multiplication of bridges across the great rivers of the West is a movement in the direction of advanced civilization. The simple and cheap pontoon bridges, by their number, may be made to do better work in facilitating intercourse than would be effected by a smaller number of more pretentious structures. For some years their service may be all that will be desired, and, as they prove inadequate, one by one they can be replaced by more permanent works.

Solidification of Powdered Metals.

Professor Chandler Roberts Austen dealt with the formation of solid metals by compressing strongly the powders of the constituent metals. Since 1878, the labors of Professor Walthere Spring, of the University of Liege, have been mainly devoted to the study of the effect of compression on various bodies. The particles of a metallic powder left to itself at the ordinary atmospheric pressure will not unite, but by augmenting the points of contact in a powder, the result may be very different. Professor Austen's experiments were made with the aid of a compression apparatus, in which the metallic powder is placed under a short cylinder of steel in a cavity in a steel block divided vertically, held together by a collar. The pressure is applied to a cylindrical rod. Under a pressure of 2,000 atmospheres on the piston, or 13 tons on the square inch, lead, in the form of filings, becomes compressed into a solid block, in which it is impossible to detect the slightest vestige of the original grains; while, under a pressure of 5,000 atmospheres, lead no longer resists the pressure, but flows as if it were liquid through all the cracks of the apparatus, and the piston of the compressor descends to the base of the cylindrical hole, driving the lead before it. The more interesting results were obtained by Spring with crystalline metals. Bismuth, as is well known, is crystalline and brittle, yet fine powder and bismuth unite under a pressure of 6,000 atmospheres into a block very similar to that obtained by fusion, having a crystalline fracture. Tin, when compressed in powder, unites, and if it is made to flow through a hole in the base of the compression apparatus, the wire so formed sometimes, though not always, emits the peculiar "cry" of tin when bent. The following figures show the amount of pressure required to unite the powders of the respective metals: Lead unites at 13 tons per square inch, tin at 19 tons, zinc at 38 tons, antimony at 38 tons, aluminum at 38 tons, bismuth at 38 tons, and copper at 33 tons. Lead flows at 33 tons per square inch, tin at 47 tons.

The Architect's and Builder's Edition of the Scientific American.

The November number of this splendid architectural journal has been out a few days, and may be obtained at book stores, news stands, or by mail direct from this office. Price 25 cents.

Besides two full pages of colored illustrations of new dwelling houses, the November issue contains engravings of a number of low priced houses, of recent construction, representing the latest designs and accompanied with plan views, showing the interior arrangements of the houses. This number also contains an engraving of the beautiful municipal building just completed at Glasgow, also the design for a new and magnificent hotel at Richmond, Va., a view under the central dome of the exposition building of Glasgow, and the New York *Times* nine story handsome building, which is nearly completed, and views illustrating the manner in which the building was reconstructed without disturbing the compositors or other employes or the printing presses or other machinery used in producing a daily newspaper, which feat was never before accomplished on so extensive a scale.

A small country church, with plan of the arrangement of the seats, and a stable and carriage house of moderate cost, are among the many other useful subjects treated in the November number; and any persons contemplating the building of a new house, or the remodeling of an old one, will find it to their advantage to consult all the back numbers (thirty-seven already published) of the ARCHITECT'S AND BUILDER'S EDITION of the SCIENTIFIC AMERICAN, and whoever does it will be very likely to save a good many dollars, besides being better satisfied with his improvement from the good suggestions he derived from their perusal.

THE cranks of the age are for the present turning from the congenial labor of inventing perpetual motion machines to invent a new language, which they call "Volapuk." It is a conglomeration of all the modern and some of the dead languages, and an experienced linguist can see little sense in it. When a miller receives a letter informing him that "Klub at alabom rigi omik in lenpuk pegivol sis vigs kil komu volapukaklubi keli opubobs sosus olabobs spadi e vodabuk upubom egetobs bletimo penedi estabobs," he need not be alarmed. It is not a complaint that his flour is "off," nor a death warrant, nor a notice of the coming of the sheriff. It is simply a "volapuk" crank unloading his superfluous and valueless attainment.—*Milling World.*

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FACTS AS TO LONG LIFE.

What tends to long life is a study with more profit as facts are used for data. The editor of a Boston paper, unread in theory, sent blanks through Massachusetts to men and women of eighty years and more, inquiring as to habits, state of eyes, teeth, hearing, and the like, getting over 3,500 replies, and if in these there is nothing to refute the assertions of the theorists, there is yet not anything to sustain them.

They ate meat, save in a few cases, *ad lib.*, and though none of them, if we take their own word for it, have drunk freely of spirits, all, or nearly all, have taken of them on occasion. These old people are from cities, towns, agricultural and maritime districts, in nearly all cases leading active lives, eating three meals a day, the dinner being, as is the custom in New England, in the middle of the day, of meat and vegetables, and pie, and very hearty. Curiously enough, though the women are of medium height, the men are mostly tall, above the average; and so greatly do blue and gray eyes prevail that other shades are notable exceptions. Baldness is rare, the hair being usually brown and thick, but the teeth are very poor or entirely gone. The report says:

"These old people, men and women alike, are early risers almost without exception, and fully nineteen out of every twenty have observed this custom through life, except, perhaps, in some short period of youth. . . . Exercise has been hard up to sixty-five or seventy years, and after that period has consisted (when the regular occupations have been given up) of walking or gardening, or both. Except in cases of sickness, these old people are as active and as fond of constant occupation of some sort to-day as most men and women are at thirty-five. One of the most significant facts gathered in this canvass is that regarding occupation. Out of 1,000 men, throughout life, 461 have been farmers; 92 have been carpenters; 70, merchants; 61, mariners; 49, laborers; 42, shoemakers; 41, manufacturers; 23, clergymen; 23, masons; 16, blacksmiths; 16, bankers; 12 each iron workers, mill hands, physicians, and lawyers; and the rest are divided among nearly all the other trades and professions. Eight hundred out of twelve hundred have been farmers' wives, and all but about fifty of the remainder have been housewives."

Tea and coffee drinking was indulged in by fully two-thirds of the 3,500, with some of them to excess; and of the men, nearly all have both smoked and chewed tobacco, the amount daily consumed by some having been enormous.

Their cares were as heavy as those which come to most of the human family, their work not less arduous. Most of them led lives which some might call monotonous, yet with occasional excitement to them as great as the intenser kinds to those more used to it.

Summing up all that the compiler has set down from the answers sent to his questions, we find that all were regular in their habits, with plenty to occupy their hands and minds and getting plenty of fresh air. This seems to be at least a primal quantity in the solution of the problem of long life. Men like these, with plenty of work and fresh air, are able to eat and smoke, even to a point we would call excess, without injury, and even to drink at times with no evil resulting. It is those of sedentary habits, who do no hard labor and get little exercise or fresh air, who must be the most careful.

QUICK LETTER DELIVERY.

No mail service can be said to be good enough while a better one may be had. In New York City such possibility is clearly in sight, the means at hand, the way clear, and all that is wanted to take advantage of the conditions existing, an order from the postmaster-general and the preparation of a time schedule. Three lines of elevated roads traverse the city, with trains running constantly and rapidly, and horse car lines bisecting them at every principal point. How easy to dispatch a letter quickly by means of these, if only some of the "routine" and manipulation now employed were dispensed with! Now, a letter posted say in lower Broadway and directed to West 25th Street, must needs be taken to the general post office. Thence it goes uptown, perhaps by elevated train, perhaps by wagon, and to the sub-station nearest. As will be seen, it is delayed while *en route* to the general post office, again, if it goes by the elevated, while taken afoot to the sub-station. Supposing now the sub-stations were all arranged on the line of the elevated roads or the crosstown horse car lines, and let us suppose also that the carrier, on finishing his collections from the lamp post boxes, takes his letters directly to the nearest elevated railroad station, leaving the pouch for the first post car [a small section of a car would be sufficient for the purpose, and say there was such a one every 15 minutes]. With the letters assorted simply as to the nearest sub-stations, the work could be quickly done, a man from each ready on the platform to take the packet for his station, and then hurrying off to the near-by branch office or taking a crosstown car for it, leaving a mate to await the next trains, down and up.

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In this way a rapid service could be had, and a reliable one.

Like many another rule observed in public departments and "circumlocution" offices, that which provides for all letters collected downtown going first through the general office, or uptown only through certain specified "distribution" offices, is a long way around without, by any means, being the shortest way to security. At present, the collector and the distributing clerk in the post office to whom he hands his mail pouch are held responsible for letters dropped in the boxes of a certain district. Would there be any less responsibility, any less security, in handing the same letters to a similar clerk on a moving train? The system of receipts now in vogue in the post office is good enough for the system here suggested. The collecting carrier, on turning over his letters to the mail agent, might get a receipt for them, with the time of day appended; the receiver, one of the messenger from the sub-station, and so on. Thus the claimant for a lost letter need only have a record of the position of the lamp-post box he dropped it in, and the time, in order that a "tracer" might be started after it.

The business messenger boy system grew directly out of a public need of quick delivery, and the local telegraph system as well. Both are too costly for the use of the general public, not to say too slow and uncertain. The allurements of duck-on-a-rock, mumble-the-peg, and street ball are likely always to prove too strong for the average messenger boy, as well as the inclination to walk and save his fare; and telegraph offices are too few and far between to venture competition with a public messenger service supplied with well trained, well tested, well watched servants of mature years.

At present, the time required to collect and deliver a letter varies from about two hours, under the most favorable conditions, to about four—under the least. Under the plan suggested it seems not unreasonable to estimate two hours as the longest period required, and the average time as much less. There are, of course, even quicker means of letter distribution than that outlined. There's the pneumatic, which, in Europe, has proved so efficient, and here in America has been improved on. It is proposed you put your letter in a lamp-post box, and, whisp! it is in the post office before you are gone. At the post office it is put into another pneumatic tube, whence it flies to the uptown sub-station. Thus, when you drop your letter in the box, you as good as put it into the hands of the letter-carrier in the far off sub-station near its destination; its dispatch depending on him.

No doubt we shall have such a system in the future for letters, and, indeed, for small parcels as well. Till then we might reasonably expect to have a system at least as rapid as the conditions already existing will supply, and in seeking for such a system we ought not to overlook the opportunities for quick letter transit offered by the horse cars, as well as the elevated roads.

The Russian Asiatic Railway.

The opening of the great Asiatic railway has just been celebrated at Samarkand, in Bokhara, about three hundred miles from the Chinese frontier and three hundred and forty from the boundary of British India. This is the present terminus, but an extension to Tashkend, two hundred miles further north, has already been surveyed. Although constructed for military purposes, the railway will probably be utilized to develop the country commercially, and under the military administration some experiments have been made in irrigation, which show portions, at least, of the arid country through which the road passes to be capable of extraordinary fertility. Near some of the rivers, where systematic irrigation has been carried on, nine crops of clover are obtained annually, and cereals produce a hundredfold. Although the ties, as well as the rails, tools, rolling stock, and a part of the provisions consumed by the workmen, were brought from Russia, the construction was pushed with great economy, as well as rapidity, nearly four miles of track having often been laid in one day, while the total average cost of the line, including land damages, track, stations, rolling stock and other equipment, and telegraph line, having been only about twenty-six thousand dollars a mile. One of the most serious items of expense was for the provision of a regular and sufficient water supply in that desert region, for all the stations, repair shops, and workmen's settlements, but everything was done in the most thorough manner, all the stations, as well as the barracks for the military guard, which were necessarily attached to the stations, being built of stone. The method of laying the track was devised with great ingenuity, and carried out with military precision. A permanent construction train was arranged, conveying two crews, each consisting of four or five hundred native laborers, with a hundred and fifty soldiers to act as guards and overseers, and fitted with sleeping berths, kitchen and hospital cars, traveling blacksmith and machine shops, and provision cars, and attended by a private train of five or six cars, which served as the dwelling of General Annenkoff and his suite. Every five or six miles a siding was built, and when the day's work began, the construction train was transferred to the siding, to make room for the track-laying train, which was pushed to the extreme front of the line. The track laying train consisted usually of nine platform cars loaded with rails, eight loaded with ties, four with spikes, fish plates, and other accessories, and a dozen or so with material for stations and bridges and provisions and water for the workmen, the whole being just sufficient for a mile and a quarter of track. These trains were loaded at supply stations on the finished part of the line, and sent forward at regular intervals, and three of them were often required in a day. In order to unload them quickly, and with the least loss of time in handling and transferring materials, General Annenkoff, after some experience with the usual method, of taking the rails and ties from the sides of the cars, loading them on carts, or on the backs of camels, and transporting them to where they were wanted, equipped all the cars carrying ties and rails with runways on each side, fitted with rollers, and nearly meeting at the ends of the cars, so that the rails and sleepers, instead of being thrown overboard, and then picked up and carried where they were wanted, were simply shifted to the runways, and rolled rapidly forward to the front of the train, where they were immediately laid, or taken on trucks, if required, and carried to some point in advance.—*American Architect.*

An Interesting Discovery.

A botanical announcement of interest and scientific importance has recently been made in the Proceedings of the Natural Science Association of Staten Island. It is the discovery of a peculiar and rare hybrid oak, whose affinities and exact parentage and status have puzzled botanists and led to very different opinions as to its character. It is the *Quercus heterophylla* of Michaux, commonly known as Bartram's oak, and so designated because the typical example grew on the farm of John Bartram near Philadelphia, where it had been recognized as early as 1750 as a singular and aberrant form.

Mr. Wm. T. Davis has made the striking observation of its presence in considerable numbers and in a variety of stages near Richmond Valley Station, Staten Island, "in a low, wet piece of woodland," where, he remarks, "nineteen oaks have so far been discovered, each tree having a sort of individuality."

The point of interest is this: The oaks are addicted to hybridization, and a glance among the oaks in Gray's Manual of the Botany of the Northern United States discloses a section wherein are grouped a number of "anomalous or occasional, probably some or all of them hybrid forms." Here will be found the *Quercus heterophylla*, enumerated as "a state of *Q. Phellas* (the willow oak) with dilated and toothed or cut leaves." In the same paragraph its reference to a variety of the water oak (*Q. aquatica*) by De Candolle is quoted, while in a summary of the conflicting views of botanists relative to this perplexing tree, by Mr. A. Hollick, we find this assortment of guesses: "Pursh considered it as probably a hybrid. Nuttall thought it might be an anomalous variety of *coccinea* (scarlet oak). Barton says 'supposed to be a hybrid.' Torrey also considered it a hybird. Noll says 'doubtless a hybrid.' Meehan says that it partakes of the character of *Q. Phellas* (willow oak) and *Q. imbricaria* (laurel oak). Buckley says that the tree at Mt. Holly is 'in a thicket near several willow oaks, of which it is plainly one.' Leidy thought that a specimen which he had obtained from Burlington County, New Jersey, indicated a hybrid between *Q. Phellas* and *Q. palustris*. Englemann contended for its specific rauk at first, but finally came to the conclusion that it was a hybrid between *Q. Phellas* and *Q. tinctoria*."

The value of Mr. Davis' discovery appears from this review of previous opinions, as the accessibility of the locality and the number of the specimens may lead to definite conclusions as to the precise place of this tree in botanical nomenclature.

The weight of evidence as furnished by Mr. Davis is that the Bartram's oak is a hybrid, from the great variation of the forms of the leaves, as oscillating from entire margined elliptical examples to wedge-shaped pinnatifid states, between which are a series, graduated, and connecting the extremes, of leaves irregularly sinuous in outline and asymmetrically lobed on opposite sides. He also regards the willow oak (*Q. Phellas*) as certainly one parent, since a reversion to its characteristic willow leaf type is always obvious among the foliage of the Bartram oak. The other parent is doubtful, but in Mr. Davis' note on the locality and its occupants, he says: "There are eight additional trees greatly like those just described, and each one, as has been remarked, shows individual character, but a general resemblance in branching, foliage, and acorns runs through them all. The leaves are not glossy on the upper surface, but in a few trees are slightly downy on their under side, along the mid-ribs. The character and position of these oaks would indicate that *Q. Phellas* (willow oak), with *Q. palustris* (swamp oak), are the parents, and this latter tree abounds in the locality. The largest willow oak in the wood stands close to an equally big swamp oak, and a typical *heterophylla* about six feet high is growing up within two or three yards of their trunks. This little tree is several hundred feet away from the others of its kind."

The leaves of these trees present an interesting diversity of shapes, and reveal their composite origin. Whereas the leaves of the willow oak are simple, entire margined, and of the willow leaf shape, the leaves of the other strains of oak, as the scarlet, swamp, or quercitron, which may presumably be intermingled in the *Q. heterophylla*, are lobed and pinnatifid. These diverse tendencies in the offspring produce an entertaining assortment of various forms, and are intrinsically valuable as a contribution to vegetable heredity.

Street Bridges.

A Frenchman who was awkward enough to allow himself to be run over in the boulevards, left by will 100,000 francs to the city of Paris for the purpose of building bridges over the streets at the most frequented and dangerous points. As no measure had ever been taken, the legitimate heirs of the deceased philanthropist sued the city recently to recover the money. This woke up the sleepers, and the common council have decided on building a specimen bridge over the boulevard at the breakneck corner of the Boulevard Montmartre. If five hundred people do not interfere with five thousand conflicting opinions, Paris will be converted into a modern bridged Venice for the exhibition.

This plan of bridging a crowded thoroughfare was thoroughly tried in New York several years ago, by the erection of a foot bridge over Broadway at the junction of Fulton Street. But it proved a failure. The time and labor of climbing the stairs and the danger in descending proved to be greater difficulties to the dear people than the direct method with all its risks. So the bridge was taken down. It cost the city about $100,000. If such a bridge were provided with comfortable cars and cable to carry people up, over, and down, it would doubtless be popular.

Danger of Fire from Iron Steam Pipes.

The nature of the fire danger of all heating apparatus where flues or pipes are laid through or near woodwork seems to be misapprehended by many who might be supposed to be well informed upon such a subject. One editorial writer, addressing an audience of artisans, compares the methods by which wood is set on fire by steam or hot water pipes or hot air flues to "the drip of water falling always upon the same place," gradually wearing the hardest rock. "Thus," he adds, "a comparatively low degree of heat acting for years upon wood is able to first char, and then, under certain external influences, to set it aglow, and finally in flames." If his premise that "the temperature to which pipes and flues are raised is never high enough to set wood afire" is true—and it doubtless is not far away from verity—then the steadiness of the dripping would insure safety, no matter how long continued. Now, the manner in which a temperature too low to start rapid combustion in wood operates in originating a fire is by first reducing the oxide of iron (rust) to a metallic condition. This is possible only under certain external conditions, among them a dry atmosphere. Just as soon as the air is recharged with moisture, the reduced iron is liable to regain, at a bound, its lost oxygen, and in doing so to become red hot. That is the heat that sets the already tindered wood or paper ablaze. Where there is no rust there is no danger from fire with a less than scorching temperature in the pipe or flue. Hence the necessity of keeping steam or hot water fittings in good order.—*The Sanitary News.*

Electrical Fire Engine.

A recent invention is Prof. S. S. Wheeler's electrical fire engine. It is intended to be worked by the current of an electric light wire, which can be tapped for temporary service anywhere that it is wanted. Each engine will carry on a reel some 500 feet of insulated fine copper wires, bound together, cable fashion, so as to equal a No. 3 wire, for transmission of the current. As "it is a good deal easier to squirt electricity than to squirt water," the engine, it is intended, shall be placed near the fire and the electric connection made as is convenient. The powerful current of an arc light wire will not be required, that of the ordinary incandescent light circuit, which is much lower in intensity, being amply sufficient to run the motor of the engine. The great advantages claimed for the electric fire engine are that it can be instantaneously started up at full speed; that it is much lighter than a steam fire engine of equal power; that it costs one-third less; that it is safer and easier of control; that it is noiseless in its operations; and that it is economical. Where there are no electric light wires in the street to be tapped, it will not be impracticable to run it by means of storage batteries charged from a dynamo at the engine house or at any other convenient established point.

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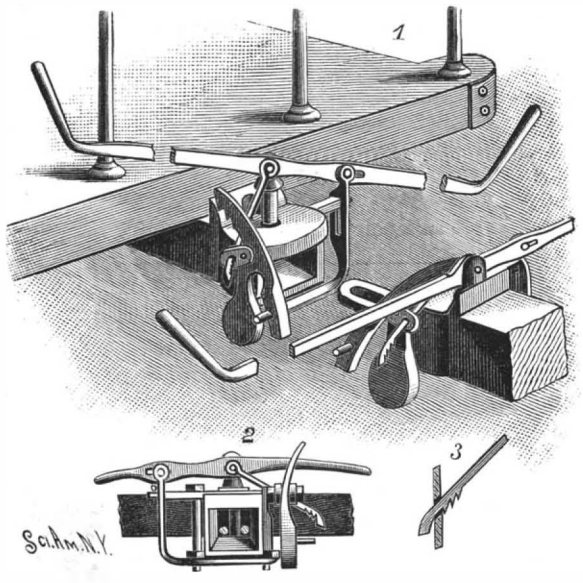
CAR COUPLING.

An improved car coupler is represented in the cut, in which a very complete action is provided for as regards the coupling process. The drawhead is of the ordinary type, so that the invention can be applied to any car with comparatively slight additions. The coupling



FOSTER'S CAR COUPLING.

pin is pivoted to the center of a transverse lever, whose ends, extending outward, can be manipulated from either side of the platform. When the lever is inclined so as to hold the pin up and out of engagement as shown in Fig. 1, it is held in that position by a rack pawl, pivoted at the same point as the coupling pin, Fig. 3, whose teeth catch in a hole in a small plate carried by a counterweighted piece swinging longitudinally. When the cars come together the lower end of this piece is struck and the catch is tripped, releasing the pawl. At once the main cross bar resumes the horizontal position and the pin drops into place through the link. As the main cross bar does this it also raises a small cross piece whose lower member extends across and underneath the opening in the drawhead. This picks up the end of the link and guides it with certainty to its place. In Fig. 2 is shown the method of applying this invention to an ordinary drawhead, where two bolts hold the whole in working position. This coupling is the invention of Mr. A. G. W. Foster. Inquiries relative to the same may be addressed to J. H. Shelmuth, Esq., Jasper, Ala.

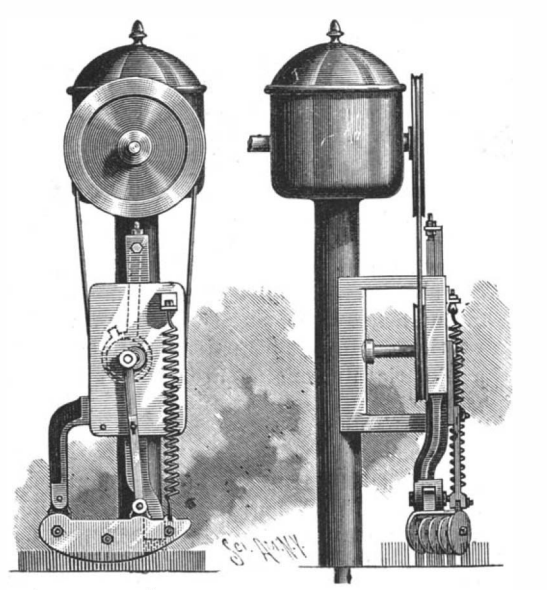
UNWIN'S DABBING MOTION FOR NOBLE COMBS

Has been in actual use in Belgium, France, England, and America from one to two years, and is, therefore, no experiment. This motion dispenses entirely with the brush so far as the large circle is concerned, and uses only a small brush, 1 by 3 inches, for dabbing into the small circle. This small brush will wear for months before requiring repairs, and the item of brush repairs, so costly on the old styles of brush motions, is, therefore, nominal on the Unwin motion. The saving in brush repairs alone will pay for this motion in a short time.

The dabbing is effected in the large circle by means of a rocking arm, to which are fastened curved steel blades, which press the wool gradually into the pins. The blades and arm are so constructed that a portion of the blades never rises above the pins. The wool is, therefore, pressed well down into the circle, and cannot possibly rise above the pins. After passing the dabber, the motion of the dabber is so easy and positive that it can be run much slower than a brush, and the circle can safely be speeded up to three revolutions per minute, while the dabber makes but four hundred strokes per minute. Owing to the reduced speed of the dabbing motion, the vibration of the comb is almost entirely avoided.

Practical tests of this dabbing motion in actual use show a largely increased production of top, resulting from the increased speed at which the comb is run, and at the same time the proportion of top is greater, and the noils are less than with a brush motion. The actual percentage of increase of top over that made on same comb by brush motion is at least three per cent.

For further information, address Paul Unwin, superintendent Manhattan Worsted Mills, 130th Street and 11th Avenue, New York.



UNWIN'S DABBING MOTION FOR NOBLE COMBS.

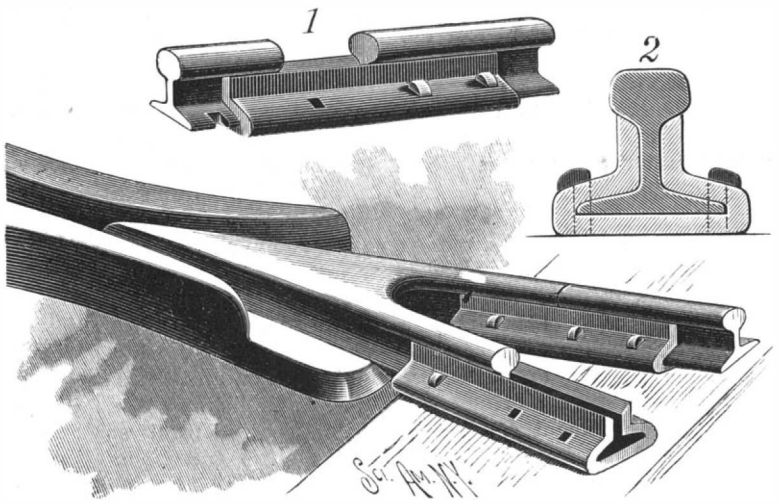
Another Flour Dust Explosion.

At Cleveland, Ohio, September 15, at 3 o'clock A.M., an explosion of flour dust fired the National Flouring Mills, owned by M. B. Clark & Son, caused a loss of $125,000, killed two men, and severely burned four others. Nobody knows how the explosion originated. It shook the earth for a mile, making buildings tremble and doors and windows rattle.

When the first fire chief arrived on the ground, he found seven men prostrate in the street. Some of them were on the outside of the building when the explosion occurred, and had been thrown violently down, while others had been blown out of the mill windows. Most of them were only stunned, and gradually recovered. The building burned very rapidly, and with it 1,200 barrels of flour and 40,000 bushels of wheat.

AN IMPROVED CHAIR, FISH PLATE, AND RAIL COUPLER.

A railway rail chair and fish plate designed to hold the rail more firmly than is ordinarily effected, and prevent the rails from getting away from a perfect adjustment in line with each other, is illustrated herewith, and has been patented by Mr. Willard Wilt, of New York City, P. O. Box 3,526. The combined chair and fish plate coupling is shown in full and sectional views in Figs. 1 and 2, being made in a single piece,



WILT'S COMBINED CHAIR, FISH PLATE, AND RAIL COUPLER.

with vertical branches forming the fish plates, these yielding laterally to embrace the web of rails of various sizes. The rail is made with spike recesses or notches, which are sufficiently elongated to allow for all contraction and expansion, while the spike holes in the chair and coupling fit exactly to the spike, preventing the rail from being drawn apart more at one point than another.

Electrical Boats.

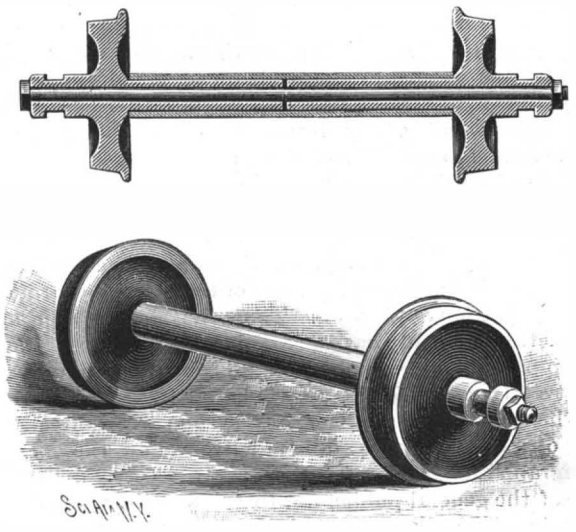
The first public pleasure boat to be driven by electrical power on the river Thames was recently launched. It is 65½ feet long, 10 feet beam, and designed to carry eighty passengers, with a mean draught of 22 inches, 12½ tons displacement, at six miles an hour, as regulated by the conservancy by-law. The electrical machinery and storage being placed below the deck fore and aft leaves a clear run the whole length of the boat for passengers. The electricity is stored in 200 Electrical Power Storage Company's accumulators, and is converted into power by two motors of 7½ horse power each, driving twin three-bladed propellers by Thornycroft & Co. The whole has been designed and built by Mr. W. Sargeant, Chiswick.

The Population of India.

The statistical abstract of India which has just been issued contains an estimate of the population of India in March, 1887, namely: British territory, 207,754,578; the native states, 60,382,466; giving a total population for all India of 268,137,044. Both in British territory and the native states the number of males is much larger than that of females. In 1881 in British territory there were 101·2 males to 97·4 females, and in the native states 28·7 males to 26·4 females, and in all India there were in that year just 6,013,419 more males than females.

AN IMPROVED CAR WHEEL AND AXLE.

An axle with wheels so attached that one wheel will run independent of the other, designed to obviate friction upon curves and prevent strain upon the axle, is illustrated herewith, and has been patented by Mr. John H. Smith, of No. 45 Cross Street, Paterson, N. J. The wheels have cast integral therewith an outer

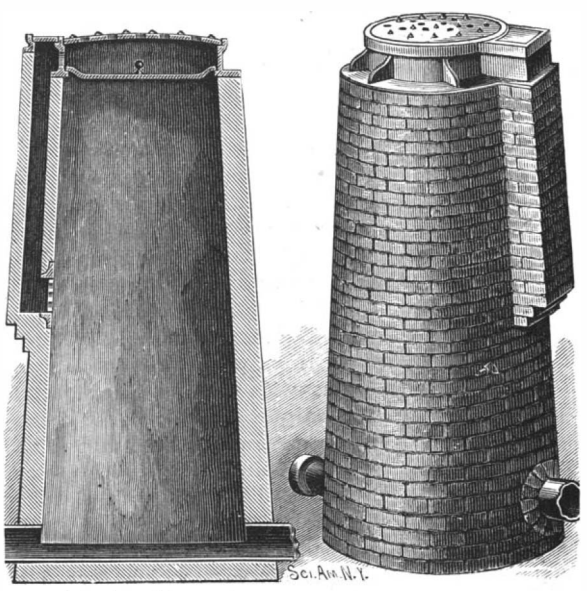


SMITH'S CAR WHEEL AND AXLE.

tubular hub, with an annular groove adapted to be journaled in any suitable form of hanger, while a sleeve is cast integral with the inner face of the wheel, of such length that when the opposing wheels are upon the track the contiguous ends of the sleeves will nearly abut, as shown in the sectional view. An outer sleeve, of a length equal to that of the usual length of the axle between the wheels, is made to cover the inner sleeves of the wheels, upon which the outer sleeve turns loosely, and a rod is passed through the hubs and sleeves of the wheels, one end of the rod having a cap or head, and its other end a nut or equivalent fastening device, or the rod may be threaded at both ends, and have the usual lock nuts.

IMPROVED VENTILATING MAN HOLES FOR SEWERS.

A construction of man holes for sewers designed to provide a free escape of the sewer gases, and, if desired, a means of purifying them before their escape, is illustrated herewith, and has been patented by Mr. Thomas W. Morgan, of Oakland, Cal. The vertical chimney or man hole, extending from the street surface down to the sewer, has its upper part finished off by a circular iron curb with a perforated cover, while a supplemental vertical flue is built at one side of the man hole, the lower end connecting therewith as shown in the sectional view, the opening being covered by a side lattice or grating. The cover for the man hole has an extension at one side, which forms a cover for the supplemental flue, and a hole or opening is made in the side of the cylindrical curb, which communicates with the upper end of the supplemental flue. Around the lower inner edge of the main curb is a projecting lip, upon which rest the edges of a metal pan or cover having a central eye bolt or handle, for lifting it out when the perforated cover is removed, the pan serving to prevent dirt from falling into the man hole. The supplemental flue or passage may be filled with charcoal or other disinfectant, whereby the gases arising from the sewer by this channel will be purified, the gases entering this flue returning into the cylindrical curb above the pan, and from thence escaping into the open air.



MORGAN'S VENTILATING MAN HOLES FOR SEWERS.

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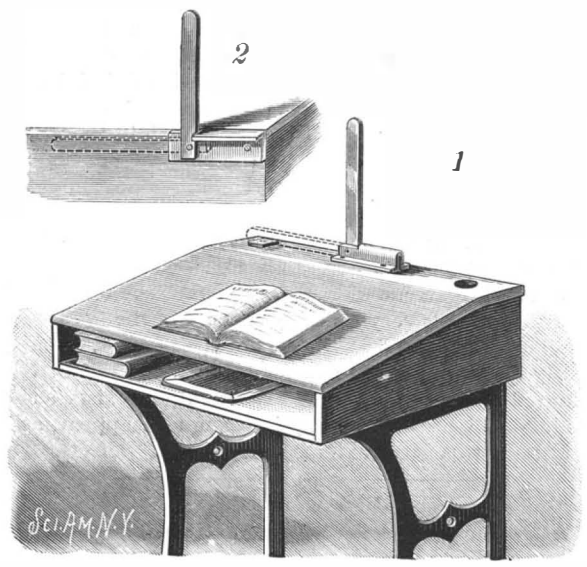
A DESK SIGNAL FOR SCHOOLS.

A simple and effective signal, to be used by scholars in schools, for attracting the attention of the teacher, is illustrated herewith, and has been patented by Mr. James C. Parker, of Woodston, Kansas. A signal arm is pivoted in a plate doubled on itself, and having



PARKER'S DESK SIGNAL.

flanges for attachment to the desk top, a part of the plate being cut away to admit the arm between its folds, and to form a shoulder for stopping the arm after it has passed a vertical position, the arm turning on a pivotal pin. Fig. 2 shows a form of signal to be placed against the front or end of the desk, the supporting plate being L-shaped in section. To give a signal, the scholar lifts the arm from the position shown in dotted lines into the position shown in full lines.

MICROSCOPICAL NOTES.

At the meeting of the Microscopical Section of the Brooklyn Institute, which occurred on the 15th of October, "Circulation in Animal and Vegetable Tissues" was the subject for the evening. It will be impossible within the limit of an ordinary article to minutely describe all the objects exhibited. Among vegetable organisms, the circulation of the sap in the nitella was shown, also the circulation in the beautiful desmid colosterium.

Among animal organisms was shown the circulation in the daphnia, or water flea, the minute heart being made clearly visible by the transparency of the shell of this little creature. The circulation of blood in a frog's foot was shown by Mr. Stephen Helm, by stretching the foot so as to distend the web, as shown in Fig. 1. Mr. Helm's apparatus consisted of a thin, apertured piece of wood, provided with a glass slide upon which to rest the frog's foot. Mr. Caleph suggested the use of a piece of cork for this purpose, omitting the glass slide.

We illustrate this frog plate, as it is the simplest that has as yet come to our notice. The plate consists of a slice of cork, with a hole near one end corresponding with the hole in the stage of the microscope. The frog is wrapped in a wet cloth and held in place upon the cork by means of a small rubber band. One of the frog's legs is extended. To two or three of the toes are attached threads which are held under tension by ordinary pins stuck into the cork. The foot is moistened to render the web more transparent, and the circulation is observed with a three-fourth or one inch objective.

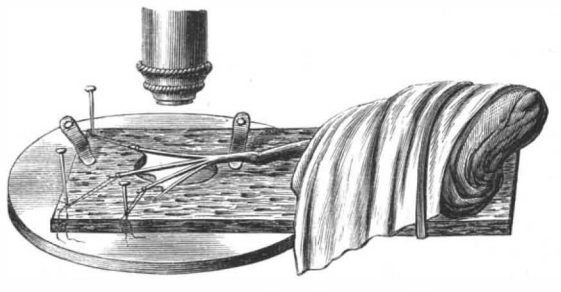


Fig. 1.—SIMPLE FROG PLATE.

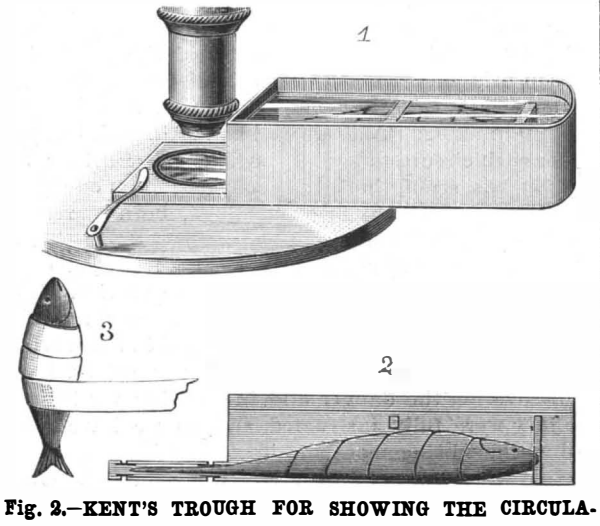


Fig. 2.—KENT'S TROUGH FOR SHOWING THE CIRCULATION OF BLOOD IN A FISH'S TAIL.

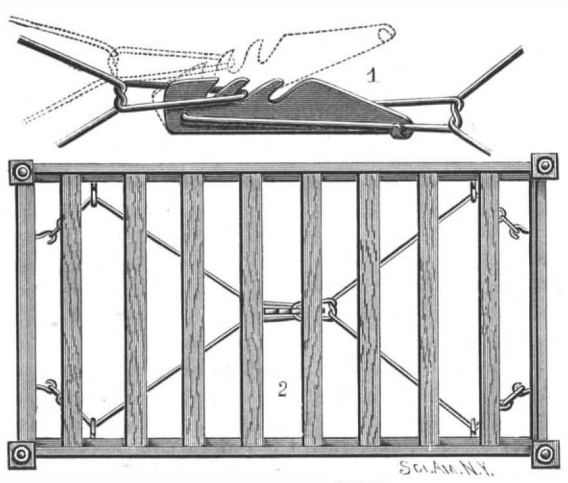
The president of the section exhibited the circulation of blood in the tail of a goldfish. This exhibit required more complicated apparatus, which consisted of a metallic tank provided with a thin extension, having in its upper and lower sides glass windows, formed of cover glasses set in recesses and secured by marine glue. The fish was wrapped in a strip of thin muslin, to deprive it of the use of its fins. It was laid upon its side in the tank, as shown in Fig. 2, with its tail between the two windows, allowing the light to pass upward through the tissues from the mirror of the instrument. The tank is filled with water, and, to prevent the fish from jumping, small wooden cross bars are placed in different positions in the tank. Arranged in this way, ths fish may be observed for about twenty minutes. The blood is seen flowing in crimson streams in various directions through the tissues of the tail. An inch or three-quarter inch objective is ample for this purpose.

The blood of the frog is white, and the corpuscles are larger than those of the fish, but, as compared with the corpuscles of human blood, those of the fish are larger.

G. M. H.

AN IMPROVED BED STAY.

A simple and inexpensive stay for bedsteads, to brace them against racking strains, is illustrated herewith, and has been patented by Mr. Cade Bethea, of Mobile, Texas. Two mainstay wires are doubled at their center parts, and twisted a turn or two to form a long loop on one and a shorter loop on the other, the ends from one loop diverging toward the head board and side rails, while those from the other loop diverge toward the foot board and side rails. Each wire passes through eyes or staples fixed in the side rails, and its



BETHEA'S BED STAY.

extremity is connected to hooks, eyes, or staples in the head or foot board. A locking device, shown in the small figure, is fulcrumed on the end of the long loop of one of the stay wires, this device having a laterally bent hook or lip at one end to catch under one side of the stay loop, and having one or more notches in one edge, whereby the mainstay wires may be drawn or strained up tightly, in the manner indicated by the dotted lines. By this means the corner posts are held firmly to the head and foot boards and the opposite side rails, and the latter are also drawn tightly to the ends of the bed slats.

Dr. Schliemann's Excavations at Mycenæ.

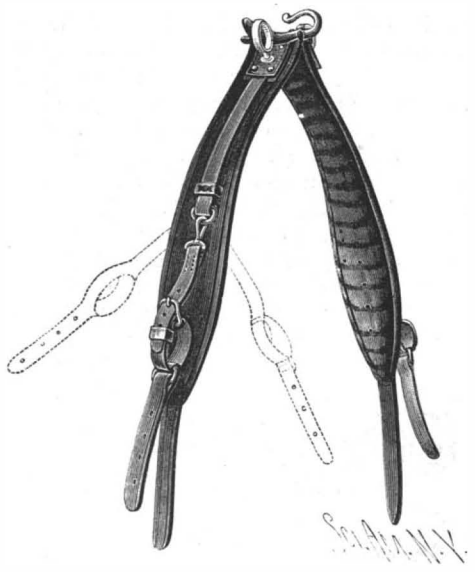
The excavations commenced by Dr. Schliemann at Mycenæ are still being energetically carried on, and continue every day to bring to light fresh objects of great archæological and anthropological interest. The entire terrain around the town is full of tombs belonging to an epoch antecedent to Homer. These pre-Homeric sepulchers are cut in the solid rock and carefully formed in regular compartments, with an area of from thirty-five to forty square meters. In these chambers the dead were laid without being covered with earth, nor were they cremated, as at the time of Homer. Among the numerous objects discovered at Mycenæ in the course of the latest diggings are articles of glass, crystal, and ivory, besides precious stones with engravings of animals charmingly executed, the whole treatment being Oriental in character.

Delivery of Pipes.

A cylindrical pipe, flowing full, discharges less than the same pipe when only filled through a segment whose arc is 281 deg. 30 min. by 2·5 per cent, while the velocity is less by 9·5 per cent, the hydraulic inclination being the same. The full section discharges less, and also with less velocity, in other forms of pipes as well as in cylindrical. The scouring power of circular pipes flowing full is therefore less by nearly 10 per cent than that of the same pipes filled through an arc of 281 deg. 30 min.—a new element to be considered in the arguments for and against circular pipe sewers.

AN IMPROVED GIG SADDLE.

A construction of gig saddle, with the attachment of the tug straps thereto, whereby the saddle is kept from material movement on the back of the horse, and there is less wear and tear upon the saddle, is illustrated herewith, and has been patented by Mr. Marcellus

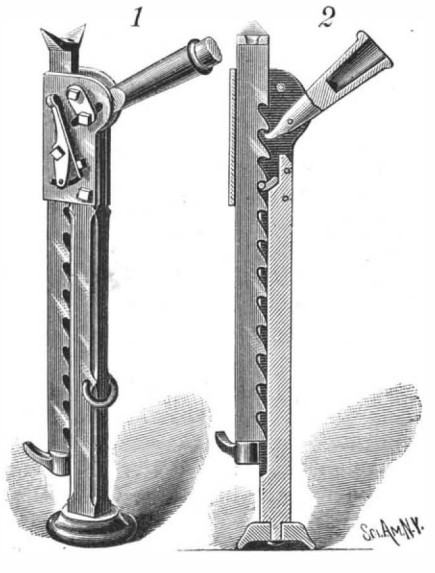


HITT'S GIG SADDLE.

M. Hitt, of Luray, Va. The pad, skirts, and saddle tree are of the usual construction, the tug straps being fastened at their upper ends by the terrets, while the lower end of each tug strap is securely fastened to the skirt to hold a buckle or ring, the end of the strap being folded under and secured to the skirt by rivets. The thill loop has at its upper end a snap hook by which it is connected to the ring held on the lower end of the tug strap, permitting the thill loop to be readily attached and detached from the harness, so that the loop may remain on the thills. This obviates the necessity of slipping the thills through the loops in hitching up, or when the thill is through the loop on one side, the other side can be detached and slipped on the thill without moving the horse or vehicle. With this construction the saddle is held in perpendicular position while the horse is in motion, the only movement being from the snap hook to the thill, as shown in dotted lines.

AN IMPROVED JACK.

A simple form of jack, by means of which a hold or purchase may be obtained on a log where but limited space is available, is illustrated herewith, and has been patented by Mr. Leroy O. Lander, of Tacoma, Washington Ter. The body of the jack has a concaved base, and a guide groove for the lifting bar, which is held to the body by a strap or casing, one of the bolts by which this casing is held to the body affording a pivot for the two links which carry the operating lever of the jack, a bolt connecting the links and lever, the bolt working in guide slots formed in the casing. The toe of the operating lever engages the teeth of the lifting bar as shown in the sectional view, Fig. 2. The spring dog engaging the lifting bar is pivoted to the outer face of the casing, the spring acting to normally maintain an inwardly projecting stud or pin of the dog in engagement with one of the teeth of the lifting bar. The foot of the lifting bar is so pivoted that the foot may be swung or turned at any angle to the longitudinal axis of the bar, whereby the foot may be made to engage the end of the log from either side or from the front of the jack. The head of the bar flares outward



LANDER'S JACK FOR LOGGING, ETC.

from near the center, to afford a firm seat against the side of a log. The arrangement of the operating lever and links, with the connecting bolt, allows of the ready engagement and disengagement of the operating lever and ratcheted lifting bar.

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The Problem of Artificial Lighting.

In the course of a series of articles setting forth the modern view of electricity, Professor Oliver J. Lodge arrives at the conclusion that "light is an electrical disturbance, and that light waves are excited by electrical oscillations;" which conclusion he believes must ultimately have practical import. Professor Lodge remarks that our present systems of making light artificially are wasteful and ineffective. We want, he says, a certain range of oscillation—between 7,000 and 4,000 billion vibrations per second; no other is useful to us, because no other has any effect upon our retina. But we do not know how to produce vibrations at this rate. We can cause strings to vibrate one or two hundred or a thousand times per second, with the result of emitting a pure tone of definite pitch; but to get much faster rates of vibration, we have to fall back upon atoms. We can make atoms vibrate by what we call heating the substance; but the vibrations are then infinite in number and mode, and only a few of them are of use to us. As we do not yet know how to separate the vibrations that are useful to us from the great majority, we are obliged to excite them all together, at an obviously unnecessary expense. We take a lump of matter—say, a carbon filament or a piece of quicklime—and by raising its temperature, we impress upon its atoms higher and higher modes of vibration; not transmuting the lower into the higher, but superposing the higher upon the lower, until at length we get such rates of vibration as our retina is constructed for, and we are satisfied. The process is evidently wasteful and indirect and empiric. We want a small range of rapid vibrations; and we know no better than to make the whole series leading up to them. It is, says Dr. Lodge, "as though, in order to sound some little shrill octave of pipes in an organ, we were obliged to depress every key and every pedal, and to blow a young hurricane." If this remark applies to the incandescent electric lamp and to lime light, it also applies with even greater force to lights of combustion, in which a great amount of radiation is produced, but is not wanted; the only result really desired being the minute, almost infinitesimal, fraction of the whole effect which enables us to see. In short, the production of light waves, without any others, is held out by Professor Lodge as the problem of artificial lighting for the future.—*Journal of Gas Lighting.*

Diagnosis of Human Blood.

The diagnosis of human blood is discussed by Dr. Henry Formad in the *Journal of Comparative Medicine.* Especial attention is given to the methods of examining blood stains and measuring the blood corpuscles.

For testing the question whether a certain substance is blood or not, the spectroscope and chemical reagents come into play; but for the recognition of human blood the microscope alone is of any value, and the sole method yet found available with this instrument is that of measurement of the corpuscular elements. The differentiation of mammalian blood from that of lower orders of animals is made easy by the fact that in mammals alone is the cell round and non-nucleated. The differentiation between the blood of man and that of lower mammals depends entirely upon the micrometer.

Only the following animals have corpuscles larger than man, *i. e.*, larger than $\frac{1}{3200}$ of an inch, viz., the elephant, great ant eater, walrus, sloth, platypus, whale, capibara, and (according to Wormley) opossum. Animals the corpuscles of which are slightly below man in size, *i. e.*, having corpuscles from $\frac{1}{3500}$ to $\frac{1}{3200}$ of an inch average diameter, are the seal, beaver, musk rat, porcupine, monkey, kangaroo, wolf, and guinea pig. None of these are domestic animals. All other animals, including all domestic animals, have blood corpuscles of a mean diameter less than $\frac{1}{3500}$ of an inch; and, in fact, those animals which, as a rule, are blamed for blood stains found on the clothing and apparel of criminals (ox, pig, horse, sheep, and goat) have corpuscles with an average diameter less than $\frac{1}{4000}$ of an inch. He summarizes the facts as follows:

1. The blood corpuscles of birds, fishes, and reptiles, being oval and nucleated, can never be mistaken for human blood.

2. Fresh human blood cannot be mistaken, under the microscope, for the blood of any animal the corpuscles of which have a mean diameter of less than $\frac{1}{4000}$, or even $\frac{1}{3500}$ of an inch.

3. (*a*) If the average diameter of blood corpuscles in fresh blood is less than $\frac{1}{4000}$, then it cannot possibly be human blood; (*b*) if the diameter is more than $\frac{1}{3500}$, then it may be human blood; (*c*) if the blood corpuscles, after exhaustive measurement, give a mean diameter of more than $\frac{1}{3500}$, then it *is* human blood (provided it is not the blood of one of the wild beasts referred to).

The foregoing applies especially to the diagnosis of fresh blood. With regard to dried blood, it is claimed that this can be recognized just as readily, provided it has dried quickly. Blood that has dried slowly undergoes decomposition, and its morphology cannot be made out. A good liquid for remoistening blood is Muller's fluid; but perhaps the best is Virchow's solution, composed of thirty parts caustic potash and seventy parts water. At least five hundred measurements should be made in order to establish the average diameter of the cells.

If the corpuscles are spheroidal from absorption of moisture, or crenated from drying, they may still be diagnosed, because such changes are the same in the corpuscles of all animals, and have really their proportionate and corresponding ratio of alteration in form and diminution in size, the range or scale of diminution being always alike in the same animal.

The red blood corpuscles that have become spherical from imbibition of liquid have thus presented in Dr. Formad's experiments the following average diameters in the various animals: 1. Man, $\frac{1}{4800}$ inch. 2. Guinea pig, $\frac{1}{4800}$ inch. 3. Wolf, $\frac{1}{4600}$ inch. 4. Dog, $\frac{1}{4800}$ inch. 5. Rabbit, $\frac{1}{4900}$ inch. 6. Ox, $\frac{1}{5600}$ inch. 7. Sheep, $\frac{1}{6700}$ inch. 8. Goat, $\frac{1}{8100}$ inch.

These figures show that the diameter of the artificially spherical corpuscles in each animal is just about one-third less than that of the normal biconcave or disk-like corpuscles of the same animals.

The question has long been a mooted one as to whether the microscope can be depended on to determine positively or not that a given specimen of blood is that of a human being. Dr. Formad believes that this can be done, while other microscopists of equal eminence deny the possibility.

One-year Clocks.

W. H. Douglas, the author, pointed out that the great majority of clocks of the present day were dependent for accuracy of time on the isochronous beats, in a vertical plane, of a simple suspended oscillating pendulum, governing the motion of the wheelwork by an escapement which allows one tooth of the escape wheel to pass at each swing, the length of the pendulum regulating the rate of escape. Galileo discovered the isochronous property of an oscillating pendulum and its use to regulate clocks. Isochronous beats in a horizontal plane can also be obtained by a pendulum or weight suspended by a torsion spring and made to rotate backward and forward, allowing one tooth of the escape wheel to pass at each swing or turn of the pendulum, and thus to regulate the rate of escape. Coulomb, 100 years ago, found by experiment that the torsion pendulum within certain limits is also isochronous, and is affected by change of temperature exactly in the same proportion as the oscillating pendulum of Galileo. The torsion pendulum has a very much slower rate, and by its use escape of the energy of the main spring is reduced, so that it is possible by the use of the oscillating pendulum and a detached lever to apply the torsion pendulum to eight-day clocks, by this means converting them to clocks requiring to be wound only once a year. There is no change whatever in the wheelwork or main spring of an eight-day lever clock, except in the balance. The balance is removed, and in its place a lever is fixed to the staff carrying the roller pin which unlocks the lever escapement, and receives an impulse at each beat in the usual way, the additional lever imparting impulse to a tooth attached to the pendulum, thus inducing torsion at each beat of the clock. The regulation is effected by increasing the weight of the pendulum to make it lose, or decreasing the weight to make it gain. It is also regulated by means of a French sliding curb, moved by a screw to the right or left, which lengthens the spring as desired, either to make it go faster or slower without stopping the clock. The advantage gained by using the torsion pendulum with this escapement is that the present form of an eight-day lever timepiece may be at once transformed into a clock that will continue to go accurately without rewinding for twelve months. The escapement may be described as a frictionless pendulum; the impulse given direct across the line of center, as in the chronometer, is independent of oil and becomes detached at each beat; the isochronous property of the pendulum is not deranged by friction of any kind whatever. The cost of manufacture is precisely the same as in producing an eight-day timepiece.

The above is from a paper read before the British Association. It is to be hoped some of our ingenious clock makers will produce these year clocks. There would be a great demand for them.

How the English Maintain Foreign Commerce.

The Canadian Pacific Railway Company has signed a Pacific mail contract with the English government, says a Montreal dispatch. The service is to commence in 18 months, and the company will receive $225,000 annually from the Imperial government and $75,000 from the Dominion government, for ten years, for a monthly service to Yokohama, Hong Kong, and Shanghai. If an 18 knots average can be made on the Atlantic end, the Canadian route to Hong Kong can easily compete with the Suez line. The necessity for fast ships is thus indicated, and the dispatches hint that Australia, with only 4,000,000 population, pays $1,575,000 for purely ocean service, instead of the small amount appropriated by the Dominion as above given.

Vaccination.

That smallpox has greatly declined in England during the past fifty years is apparent from figures which have been published by Dr. Henry Thorne. From 1838 to 1842 the deaths from smallpox in England amounted to 57·2 per 100,000; in 1880–84 the death rate was 6·5 per 100,000. He thinks that vaccination has not only a direct influence in causing this reduction in the number of victims to smallpox, but that it has also a tendency to decrease the liability to the disease of children of vaccinated parents. In this connection it is interesting to note the *Medical Press* states that out of the five thousand children born every month in Paris only a thousand are vaccinated by the medical officers appointed for that purpose. The remaining four thousand infants are, therefore, either vaccinated by private practitioners or not at all. Seeing, however, that more than half the population apply for and receive gratuitous medical attendance, and that half the burials are gratuitous, it is very unlikely that all of the four thousand are vaccinated at the cost of the parents. It may fairly be assumed that a large proportion are not vaccinated at all, and that is why smallpox exists as an endemic disease at Paris, and does not disappear, as it has done, to a great extent, in Germany.

Elastic Traces.

Attention has been called from time to time to the advisability of lessening as much as possible the shock and strain which horses usually sustain in setting heavy loads in motion. There have been a number of methods suggested for obviating this, but there has been no general introduction of any of the systems proposed. The wear and tear on horses in our street car lines and heavy transport trucks is very great, and in all large stables of this class there are to be found a number of horses on the retired list, who are suffering from sore necks and strains occasioned by the sudden shocks and jerks of starting a heavy load. One of the simplest of contrivances we saw at the recent New Jersey State fair, used in plowing. It consisted of a spring at the point where the traces join the whiffletree. At the Eastern Railway station, at Paris, the horses used for shifting the cars from point to point have been provided with chain traces terminating in spiral springs. Since this system was introduced, about six years ago, there has been a marked improvement in the condition of the horses, and there has been much saving in the breaking of chains and harness. The horses have learned that a steady, even strain serves better than the quondam jerk at starting, and there has been found to be fewer sore necks, and the animals experience less fatigue, and are generally in sounder condition. The experiment has proved so far successful that this method has been extended through all the other departments of the extensive railway system under the control this company.

Low Bridges.

A brakeman, on so dark a night that he could not see around him, at the request of the engineer in charge of the train went to the top of a car to set the brakes, as was his duty, and without any fault of his own was knocked off the car, and seriously injured, by his head coming in contact with a bridge, built by the defendant company so low as not to allow a man on the top of a car to walk and stand erect. The brakeman had no knowledge or express notice of the dangerous nature of the bridge, or any opportunity of finding out its dangerous character.

Held, that he was entitled to damages against the defendants. There are cases which held that in such a case railway companies are not bound to erect the overhead bridges constructed by them of such a height that brakemen can stand or walk erect upon the tops of the cars without coming in collision with them. As applied to this case especially, we cannot approve of those rulings. Here the bridge was but 4 feet 9 inches above the top of the cars. The brakes were on the tops of the cars, and to get to them the brakemen were required to pass over the tops of the cars, not only in the day time, but also in the night time, and often doubtless, as in this case, when the night was dark, raining, and foggy, and when it would be almost, if not quite, impossible for them to know of the proximity of such bridges when called to brakes upon moving trains, even if they had knowledge that such bridges were maintained. To erect and maintain such bridges under such circumstances is negligence. Further reflection has strengthened the conviction on our part that this conclusion is fully sustained, both by reason and the better authority.

The danger from such a bridge is not a hazard ordinarily and naturally connected with the service. It is not shown that he was informed of the danger, nor that he had knowledge of it when he engaged in the service. As to his duty to exercise care for his own safety, both in discovering the danger and in avoiding the injury, the jury were fully instructed, and as we have said, and without being more specific, the rule was pushed beyond what reason and the law will sanction. (Ind. Sup. Ct., June 20, 1888. Louisville, N. A. & C. R. Co. vs. Wright. Opinion by Zollars, J.)

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Correspondence.

The Purification of Salt.

To the Editor of the Scientific American:

Allow me to call your attention to an error in the article concerning the purification of salt in your issue of October 13. The purpose is to clear the salt of the *chlorides* of calcium and magnesium, and not of the *sulphates*. The first named chloride being deliquescent causes the salt to attract moisture, and the latter gives it a bitter taste. Neither should be found in a good article of dairy salt.

SAMUEL S. GARRIGUES,
Late State Salt Inspector of Michigan.
Ann Arbor, Mich.

The New Iron Wharf at Fortress Monroe, Va.

The new wharf or pier at Fortress Monroe, Va., for which there has been made an appropriation of $175,000, is now in process of construction.

The parties to whom the contract was awarded are the Groton Bridge and Manufacturing Company, of Groton, N. Y.

What the United States wants such a large pier at Fortress Monroe for has often been a matter of conjecture, and the question is perhaps unanswerable. At all events, the work was started last July, on what will be the largest pier, of its kind, in this country.

The length of iron wharf from shore bulkhead to face will be 320 feet, and the width 250 feet. Outside of this will be two bays of wooden piles, to act as a shield to protect the iron from the shock of heavy vessels, making the wharf twenty feet larger all around.

The piles are all cast iron cylinders, made in one, two, and three sections, varying in diameter, 8, 10, and 12 inches respectively, and of one inch metal.

The lower sections are 12 inch cylinders, 7 feet in length, with a screw flange of 12 inches at the lower end. They are to be screwed down over wooden piles, driven at 14 feet centers, and which are cut off level with the bottom.

The iron pile is screwed down until its upper inside flange rests securely upon the wooden pile, the screw flange being about 6 feet under the sand.

As the upper sections are also of the same length, it is the middle section that varies, according to the depth of water the pile is placed. At the bottom of the upper sections will be the low water bracing, of one inch round iron diagonal rods.

On the inshore portion, in water of 10 feet and under, are disk piles, mostly of one section, with a 3 foot disk for a bearing.

These are put down by means of water jets, one inside the pile, which has a 2 inch hole in the bottom, and one on the outside to guide it straight, cutting the sand away on the sides, where is the most resistance.

The reason for using wooden piles under the cast iron ones is owing to the formation of the bottom. An idea of this can be had by imagining the bottom of Hampton Roads to be a level plain of sea mud, and its sandy shores beginning say at three fathoms and rising gently at an inclined plane until above low water.

The consequence is that the outside piles, numbering about 500, have not sufficient sand under them for a bearing.

The upper sections will be filled with beton.

The deck beams and upper bracing will be 8 inch and 12 inch I beams, with 7 inch beams for cross bracing. These will be of steel.

The wharf will have seven landings, four 140 feet, one 150 feet, and two 60 feet in length, and will accommodate all the bay line and river steamers.

T. J. HAINS,
Formerly Inspector in Charge.
1824 Jefferson Place, Washington, D. C.

Effect of the Loco Weed in Oregon.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN of October 13, under heading of "Natural History Notes," you speak of the "loco" or "crazy weed" of Texas and that its reputed power of producing insanity and death has been proved unfounded. This assertion of the innocence of the "loco weed" I cannot contradict; but the fact of a certain weed (by some called the "loco") that grows on the Columbia River bottoms, between the "Cascades" and "The Dalles," that will cause temporary insanity in horses not accustomed to feed on the bottom lands, is too well known to doubt. Although I have never seen an animal directly under the influence of the weed, yet I have seen them immediately afterward, and the signs were unmistakable—the animal with his head and fore legs bruised and bleeding, the stall, manger, and feed boxes totally demolished, and everything denoting a terrible struggle. Almost every farmer occupying bottom lands will tell you the same story, not among his own stock, as they are accustomed to it, but of neighbors' teams from the uplands, that occasionally put up over night and feed of new lowland hay. The teams are watered and securely tied in their stalls and bountifully fed on the bright soft hay from the overflowed lands. About midnight the owner is awakened by a terrificuproar in the stables. Hastening thither, the teamster is astounded to see his horse or horses in a perfect frenzy of madness, rearing, striking, biting, and kicking. Nothing, however, can be done until the effects of the weed pass off, and morning finds the horse, if he has not injured himself, but little the worse for his night's antics. What weed this is I do not know, nor have I ever found any one that could positively say that they knew, but it is certain that there is something in the new cut bottom hay that will cause temporary insanity in horses. It is no uncommon thing to see a man driving a horse with a bruised and swollen head, and, upon inquiring the cause, he will answer, "Oh, I was down on the bottoms last night, and my horse got a dose of crazy weed." Whether this is the famous "loco weed," or whether it is confined to this locality, is beyond my "ken." I should like to hear from others.

H. C. COE.
Hood River, Oregon, October 23, 1888.

America Ahead in Astronomical Instruments.

Professor John A. Brashear, who has just returned from Europe, declares, through the *Pittsburg Chronicle*, that the United States, in the manufacture of astronomical instruments, is far ahead of every other country in the world.

In speaking of his trip the Professor said: "We had a very pleasant time, and I saw some astonishing things, and was treated with great courtesy wherever I went. I visited the Royal Institution at London and all the colleges at Cambridge, and had a very pleasant talk with Professor Adams, who was the discoverer of Neptune, and one of the most eminent astronomers in the world.

"The Paris Observatory is doing special work in photographing the stars. There is not much being done at the Geneva Observatory. The most important and interesting work is being done at Potsdam, near Berlin. They have the finest observatory in the German empire. I visited the laboratory of Dr. Schumann, at Leipsic. They are doing the finest work in photographing the spectrum of the gases. At Hamburg I met the great Dr. Newmeyer, who has charge of the meteorological and nautical observatory, the greatest in the world. Here sea captains from every part of the globe receive instructions for their different voyages. Storms, currents, and ocean and atmospheric temperatures are all recorded from data obtained from those who have sailed the different seas and oceans of the world.

"I also visited the observatory at Hamburg, and was shown some very interesting instruments. I visited the astronomical works of Sir Howard Grubb in Dublin. He has made some of the largest telescopes ever manufactured. When in France and Germany, I found them holding to many of the old methods of working, while Professor Grubb was more like a genuine Yankee, making steam do most of the work which is done in the other countries by hand and foot. I feel very many times repaid for my visit."

[PROCEEDINGS OF THE ENGINEERS' CLUB OF PHILADELPHIA.]

The Manufacture of Sewer Pipe by the Delaware Terra Cotta Company.

BY FREDERIC H. ROBINSON.

The works are situated on Brandywine Creek, between Heald and Eleventh Streets, and close to the Philadelphia, Wilmington, and Baltimore Railroad. They are equipped for the manufacture of all the standard sizes and shapes of sewer pipe, as well as of other work in terra cotta, and of fire brick.

The material of which the pipes are made is composed of three ingredients—two kinds of clay and a sand and clay mixed. The first is a very strong clay obtained from brick yards in the northeastern part of the city. It underlies the clay of which bricks are made. The second is a strong clay containing a red coloring matter, and is obtained from the south side of the Christiana River in New Castle Hundred, near the bridge on which the Delaware Railroad crosses the Christiana. The third ingredient is a material composed of fire clay and sand, and is obtained on the Christiana River in New Castle Hundred. These ingredients are mixed in the proportion by measurement of two parts of the strong clay first mentioned, one part of the clay containing the red coloring matter, and one part of the fire clay and sand. Made in these proportions, the mixture is placed in the wet pan, where water is added. The wet pan is a shallow circular iron pan, in which the clays are crushed and mixed by two iron wheels, following each other on edge around the pan, driven by a horizontal axle attached to a vertical shaft. This pan is placed on the ground floor.

After the materials are properly mixed, this clay is turned by a suspended shovel into the buckets of the elevator, which are attached to an endless band, in which it is raised to the third floor of the building.

Projecting from the third floor toward the second is the casting which contains the iron mould for the pipe. Into this the clay from the wet pan is thrown, and an iron plunger, moved by the piston of a steam cylinder, which piston is attached to the upper end of the plunger rods, descends vertically, compressing the clay in the mould below.

After the clay is thoroughly compressed in the mould, an iron table under the mould, attached to the upper end of a piston passing below the second floor, and forming, as it were, the bottom for the mould, descends with the pipe standing upon it. The alternate upward and downward motions of the piston which moves the plunger, and the piston which moves the table, are controlled by the operator on the second floor, where the pipes are removed from the mould.

Pipes under five inches in diameter are, when taken from the mould, immediately removed to another part of the second floor, where they have placed in them a wooden frame of the proper length, to which their ends are trimmed off and then smoothed with leather. As those over five inches in diameter come from the mould, they immediately have their spigot ends trimmed off, and are then taken by an elevator to the first floor, where their ends are finished up. These, with the smaller pipes from the second floor, are placed on end on the drying floor of the first story of the building, where they remain from three to six days, when they are ready for burning.

Branches are made by placing the branch piece, while damp, upon the main pipe, and then trimming and shaping them.

Traps are formed by hand in plaster of Paris moulds, which are made in halves, dividing lengthwise.

The walls of the kilns are of brick and are 13 inches in thickness. The kilns are circular, the largest being, inside, 22 feet in diameter, and 8 feet high to the square, surrounded by a dome.

The kiln is filled with pipes from the drying floor, placed on end. It is fired from eight fireplaces at equal distances around the kiln. Gas coal is used. Inside, the products of combustion pass through short vertical stacks toward the top of the kiln, whence they are beaten back among the pipes, and finally escape through a flue built around the kiln near the bottom, and pass in an underground flue to the stack.

At the proper stage of burning, which is ascertained by small test pieces of clay which may be drawn and examined, the attendant passes three times around the kiln, and each time throws into each fireplace a shovelful of common salt. By this the pipes are glazed.

After the sealing of the kiln, three days are required in which to fire up and burn, and three more in which to cool off and remove the pipes, which are inspected and are then ready for the market.

A Light of Seven Millions of Candles.

A correspondent of the *Times* calls attention to the new light now shown from the St. Catherine's Point lighthouse in the Isle of Wight. Prior to May 1 of this year the light exhibited at this station was described in the Admiralty list of lights as fixed, dioptric, of the first order. That is, it was a steady light produced by means of a six-wick concentric oil burner and refracting lenses, the intensity of the naked flame being equal to about 730 candles. At the present moment an electric light is being shown at St. Catherine's, the full power intensity of which was recently stated by Captain Sydney Webb, the deputy master of the Trinity House, to be equal in illuminating power to rather more than 7,000,000 candles. Every half minute, in fact—for the light now revolves—a mighty flash of five seconds' duration sweeps around the sea, and is visible at distances that seem incredible. To effect this improvement a commodious engine room has been added to the establishment, containing three steam engines of 12 horse power each and two magneto-electric machines of the De Meritens type. Two of the engines are intended to work for lighting purposes, the third being meant to work the fog signal. As a precaution against break-down, everything is in duplicate at least, with an oil light in reserve as well. The only other lighthouses on the coast of England at which the light is produced by means of electricity are Souter Point, on the coast of Durham, between the mouths of the Tyne and the Wear; the South Foreland; and at the Lizard, on the Cornish coast. But the St. Catherine's light is ten times more powerful than the best of them, the one on Souter Point. It is, in fact, one of, if not, as is believed, actually the most intensely brilliant light in existence, and one which the country as a maritime nation may certainly feel proud to see on its shores.

Is Cheap Quinine a Blessing?

The *Medical Record* is not so sure that cheap quinine is such an unalloyed blessing. It has come about that nearly every family now has its quinine bottle, that it is sold at many general stores, and that the doctor rarely meets an invalid who has not been thoroughly dosed with quinine.

The drug, when taken continuously or excessively, is an injurious one; and its therapeutic value is greatly exaggerated in the popular mind. The value of quinine in "colds," bronchitis, ephemeral fevers, anorexia, general malaise, and various other minor ills, the editor thinks, is most problematical.

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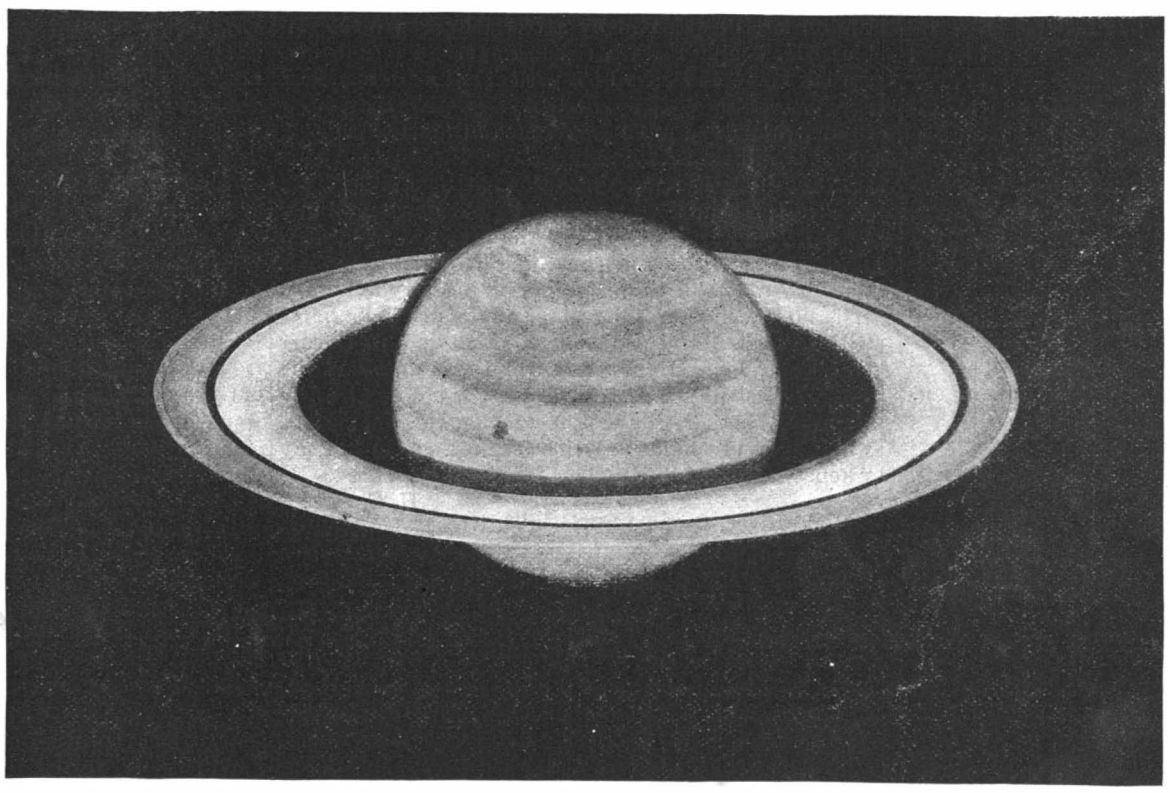
RECENT ASTRONOMICAL WORK AT THE LICK OBSERVATORY.

BY JAMES E. KEELER.

The Lick Observatory was transferred to the Regents of the University of California on June 1, 1888, and has, therefore, been in active operation as a State institution for about four months. Much of this time has been devoted by the astronomers to studying the instruments under their charge and determining the constants necessary for future work, the great telescope naturally claiming the largest share of attention; but many observations of important phenomena have been made, and the objects of greatest interest in the sky have been carefully examined with a view to the discovery of new features, as well as for the purpose of testing the performance of the lens.

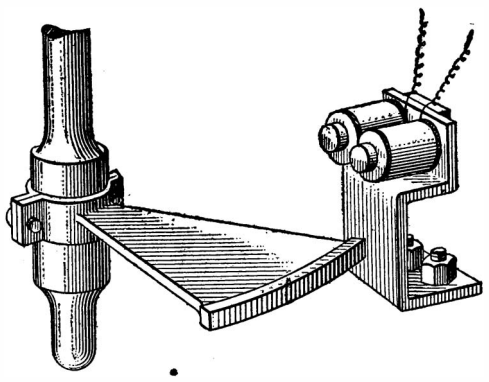


APPEARANCE OF SATURN AS OBSERVED IN JANUARY, 1888.

The sun has not yet been observed with the great telescope, but it is doubtful whether any advantage can be gained here in the study of his surface by the use of a large instrument. The seeing on Mt. Hamilton is usually poor in the daytime, owing probably to the heated air of the surrounding valleys, which is rapidly cooled at night by radiation or shut in by the fogs which then pour in from the ocean. Mercury and Venus have been seen in the daytime only, and, therefore, under the same disadvantageous circumstances. There are, however, days of good seeing, when the features of these planets can be profitably studied.

The moon is a most beautiful and interesting object with the great telescope. It was photographed throughout an entire lunation in August, and the pictures then obtained are a distinct advance on all previous work in this direction. The diameter of the lunar image on the negatives is five and a quarter inches, and with the plates used the exposure required was a little less than half a second. Observations were made with the various instruments during the total lunar eclipse of July 22, and will be published in the memoirs of the National Academy of Sciences.

Mars had become too low in the west after the transfer of the observatory to be well seen. Numerous drawings were, nevertheless, made by Prof. Holden, Mr. Schaeberle, and myself, and published in the *Astronomical Journal*. The principal canals of Schiaparelli were seen, not as double, but as single, ill-defined lines; and the continent of Libya, which, according to M. Perrotin, had been submerged or did not exist during April and May, appears on the drawings in its usual shape and position. The micrometer observations of the satellites made by myself when the planet was in opposition have been published in the *Astronomical Journal*. The satellites, which appear to have been seen with great difficulty elsewhere, were bright and easy objects with the 36 inch equatorial—a fact which affords gratifying testimony as to the superiority of the instrument and the excellence of the atmospheric conditions. Phobos was seen on July 18, when its brightness was only 0·22 of that at mean opposition and one-eighth of that at the time of discovery by Prof. Hall. From the ease with which this satellite was seen in close proximity to the planet, it seems to me probable that we can observe eclipses during favorable oppositions, and determine the mean motions of the satellites with greater accuracy than is obtainable by micrometer observations.



ELECTRIC CONTROL OF THE GREAT TELESCOPE.

Jupiter was frequently examined on fine nights in June and July. His surface showed a wealth of delicate detail which would have required a much longer time to record satisfactorily than it was possible to give. A number of observations were made of curious appearances presented by the shadows of satellites in transit. The satellites themselves appear as large and well defined disks.

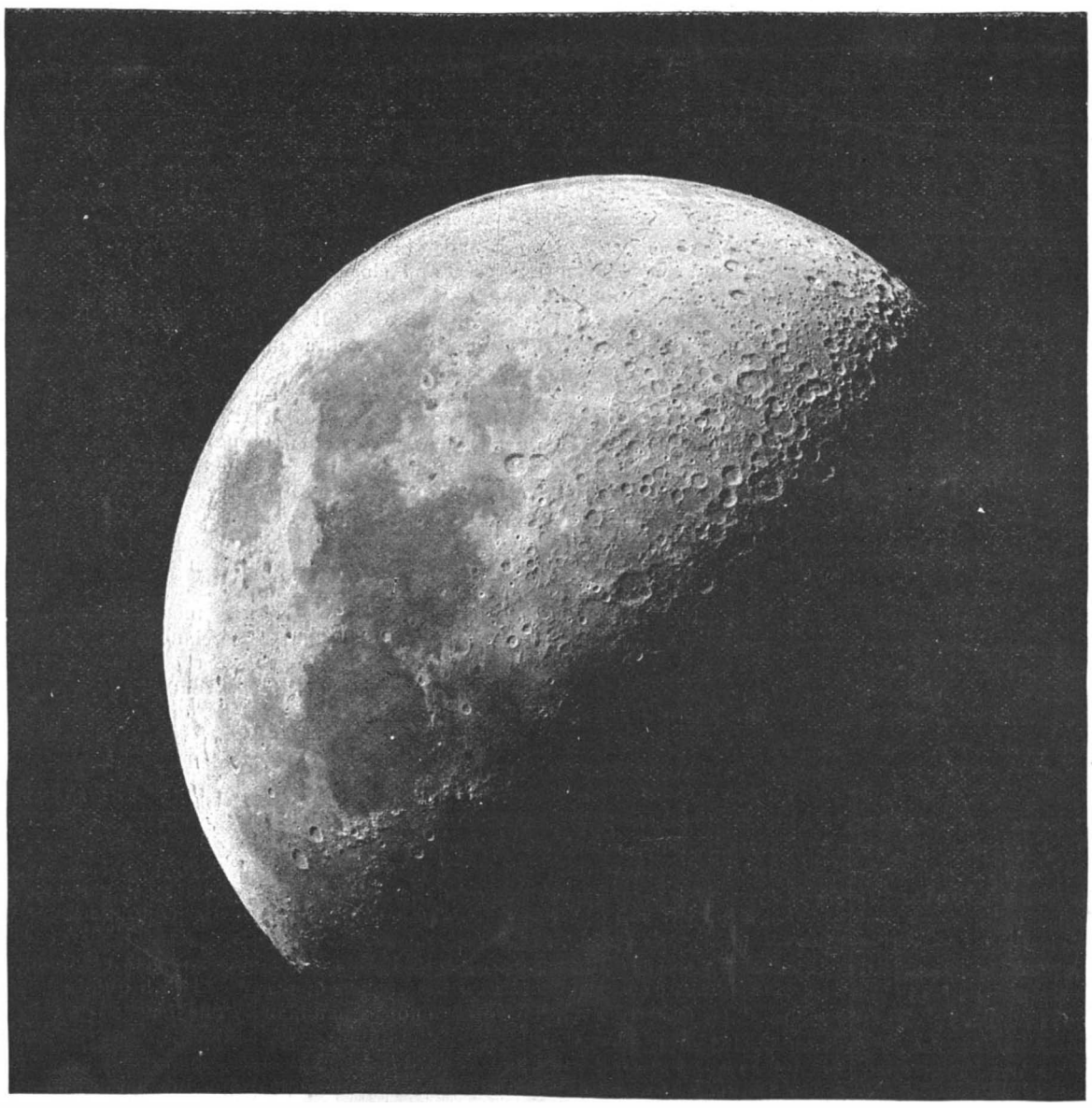
Saturn has not been observed since the telescope was first mounted in January. It was then a splendid object, all the wonderful details of the system shining with a brilliancy and distinctness probably never before equaled. The outlines of the rings were sharp and clear, and a fine dark line was seen close to the outer edge of the outer ring, with a dark shading extending inward toward the great black division. The gauze ring was very conspicuous.

Neptune has been obseved by Prof. Holden and Mr. Schaeberle, and (with its satellite) has been photographed several times.

Many double stars have been discovered and measured by Mr. Burnham with the 36 inch and 12 inch equatorials. Perhaps the most interesting of this class of objects discovered with the aid of the large telescope is the star $\rho\upsilon$ (Gamma) γ Cassiopeæ, which is found to have a minute companion distant 2·2″, in position angle 256°. It has been frequently observed lately with the 12 inch equatorial. Difficult stars previously known have also been measured by Mr. Burnham.

The planetary nebulæ have been studied by Prof. Holden and Mr. Schaeberle, who have observed in several of these objects curious helical forms, which do not appear in earlier drawings with smaller instruments.

The ring nebula in Lyra is a wonderful object in the great telescope. The central star discovered by Von Hahn is very conspicuous, and four other stars of exceeding minuteness appear within the limits of the inner ellipse, while a star almost as bright as the one in the center is seen exactly at the preceding extremity of the major axis of the ring. Many other small stars not so critically situated, and therefore less interesting, are seen in proximity to the nebula. These minute stars are beyond the range of all but the most powerful telescopes, although it may be noted that there is a class of observers with very small telescopes prepared to immediately "verify" all discoveries made by powerful instruments, even when, as has sometimes been the case, the supposed discoveries are afterward found to be purely fictitious. There is no way of disproving that a difficult object can be seen by such an observer with an apparently inadequate instrument, or of showing that excess of zeal is made to take the place of sufficient optical power. Mere size, it is true, unaccompanied by other qualities, counts for but little, and the greater part of astronomical work has been done by skilled observers with instruments of moderate dimensions. To many persons the cost and difficulty of construction of great telescopes seems out of proportion to the optical advantage gained, but the same thing is seen in other departments of astronomy, as well as outside of the science. A sextant, with which the places of the stars can be determined to within a fraction of a minute of arc, costs less than a hundred dollars, while thousands must be expended if fractions of seconds are to be taken into ac-



PHOTOGRAPH OF THE MOON, TAKEN WITH THE 36 INCH REFRACTOR.

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count, the error of position in either case being beyond detection with the unassisted eye.

The 12 inch telescope has been used by Mr. Barnard for the observation of comets and nebulæ. It has been found by him to be capable of giving photograpnic images of exquisite sharpness, and in this capacity forms an important addition to the outfit of the observatory. Twentv-five new nebulæ have been discovered by Mr. Barnard with this telescope, and a comet (comet *e* 1888) was discovered by the same observer with the 4 inch comet seeker on September 2. It is probable that the 12 inch telescope will be fitted with a new driving clock, in order to better fit it for photographic work.

No change has been made in the dome and hydraulic elevating floor of the large telescope. The convenience and, indeed, necessity of the elevating floor is every day more apparent. The rapid motion of the eye end of the telescope (a foot in eight minutes for an equatorial star) would alone make the use of an observing ladder proportioned to the size of the instrument extremely troublesome. The pier, when finally placed exactly in position, will probably be filled with brick and sand.

The driving clock of the large telescope was provided by the makers with an electric control, for keeping its rate in exact coincidence with that of a standard astronomical clock. The vertical shaft of the governor rotates in one second, and has near the bottom a small projecting pin. A stud on the end of the armature lever of an electromagnet is struck by the pin as the governor shaft rotates, when a current is passing through the magnet; but when the current is broken once a second by a standard clock, the stud is withdrawn at the proper instant to allow the pin to pass. There is also an ingenious and beautifully constructed attachment for breaking the circuit in case the standard clock should, either by accident or design, omit one or more seconds in a minute. The driving clock is adjusted to run a little fast, and is continually checked by the control, the governor being allowed to rotate by turning in a friction collar. It was found, however, that the impact of the pin on the governor shaft against the stud of the armature caused a shock which was transmitted to the telescope and produced a disturbance of the image fatal to photographic work. The control was therefore removed, and another, which I devised for the purpose of giving a perfectly smooth motion, was substituted for it. The new control answers its purpose so well, and is of such extreme simplicity, that I shall give a description of it here, as it can be applied to any clockwork having a shaft which rotates in an integral part of a second.

A soft iron sector subtending an angle of 36°, and having a radius of six inches, is clamped to the vertical axis of the governor, and rotates in a horizontal plane. The sector passes very close to the poles of an electromagnet (part of the old control) which is mounted on a slightly elastic standard of steel. At every second a strong current is sent through the coils of this magnet by means of a standard clock, the circuit being closed, as in the case of the old control, by the relay points of the chronograph attached to the driving clock. The driving clock is set so as to run a little too fast, and when the governor is started the sector gradually gains upon the click of the chronograph until it reaches the magnet of the control, when the friction produced by the attraction of the latter prevents any further acceleration, and the governor will rotate in exactly one second by the standard clock as long as the control is in operation.

The elasticity of the support on which the electromagnet is mounted plays an important part in the proper working of the control. When the sector passes at the exact instant of the passage of the current, the magnet springs in toward the sector and comes into actual contact with it, very greatly increasing the friction, while the passage of the sector at any other instant meets with no resistance, the magnet being slightly withdrawn by its support.

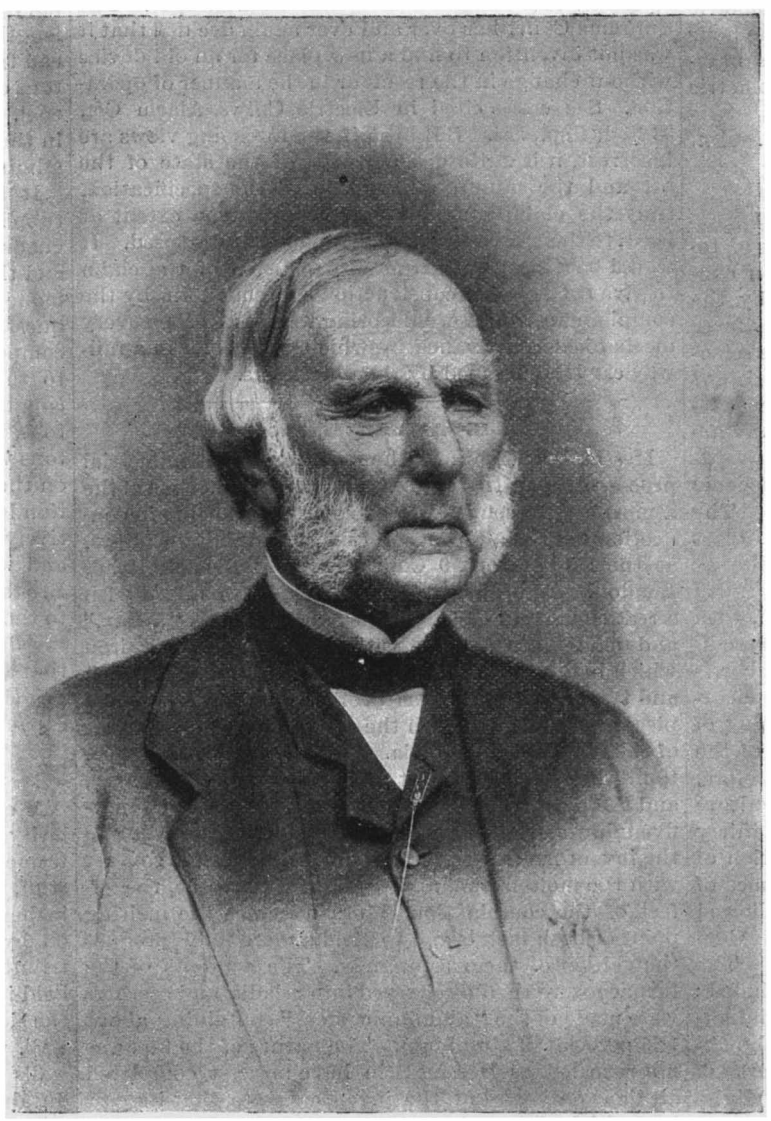
The current used with the control is obtained from the battery of twenty gravity cells, employed during the daytime in transmitting time signals to San Jose. As the signals are not sent at night, the battery is then connected with the control by turning a switch. With this control no shock is communicated to the telescope, and the image of a star is steady.

Since, however, changes of refraction and slight irregularities in the clockwork produce small displacements of the image in a telescope, it has always been necessary in photographing with long exposures to keep the telescope pointed by hand, correcting any displacement which may occur by the slow motions of the instrument. It was found impracticable to move the immense mass of the Lick telescope with the quickness and delicacy required in this operation, and after various experiments Mr. Schaeberle suggested that the photographic plate should be mounted upon double slides, one moving in right ascension and the other in declination, and should be kept upon a star by means of a diagonal microscope attached to the plate. A rough experimental model was constructed on this plan by the observatory machinist, and performed so satisfactorily that a plate holder of more accurate workmanship will be made on the same principle.

The public receptions on Saturday evenings interfere greatly with these experiments, as all apparatus must then be removed to fit the telescope for visual observation. Probably few visitors are aware of the hindrance to astronomical work caused by their entertainment, although, as a duty to the public, the sacrifice is always cheerfully made. Many fine nights are to be expected during the months of October and November, but after that fog and rain will almost put an end to observation until the succeeding spring.

Fig. 1.—JEAN CAUSEUR AT THE AGE OF 130.

Fig. 2.—NOEL DES QUERSONNIERES AT THE AGE OF 117.



THE LATE COL. GEORGE H. PERKINS, OF NORWICH CONN.

CENTENARIANS.

Mr. Emile Levasseur has recently presented to the Academy of Sciences a very interesting communication *apropos* of the "Centenarians in France, according to the Census of 1886." The number of such persons is much less than is generally supposed. Young women have the affectation to remain young, while the old men that are cited for their great age have the vanity to grow old in order to be admired.

In Bavaria, according to the census of 1871, there were 37 centenarians; but, when the fact came to be verified, only one authentic case was found.

In Canada, 421 were cited. Out of this number, the social state of 82 was ascertained by the aid of *bona fide* documents, and there remained after the examination but 9 genuine centenarians—5 men and 4 women.

In France, the same delusion exists in regard to centenarians, as is proved by the reports emanating from the bureau of statistics.

After the reception of documents relative to 184 centenarians, it was found by reference to authentic records, such as registrations of baptism, half-pay lists, etc., that the number dwindled down considerably, say to about sixty. Among these there was a person named Joseph Ribas, who was born at San Estevan de Litera, in Spain, on August 20, 1770, and who lived at Tarbes.

We add to these details two little known documents on examples of extraordinary human longevity. The first of these consists of an engraving, which we reproduce in Fig. 1. It was made by Chas. Levesque, in 1772, and is very well executed. It is accompanied with the following legend: "Jean Causeur, butcher by trade, aged 130 years, born in the village of Ploumoguer, in Lower Brittany. Painted in August, 1771, by Chas. Caffieri, sculptor, by commission, to the king, for the navy, at Brest."

The second document is relative to Mr. Noel des Quersonnieres, whose portrait is published in Fig. 2, from a lithograph made in 1845. At this epoch, Mr. Des Quersonnieres was 117 years of age. He was still living the following year, as is proved by a biographical sketch published on his account. Francois Marie Joseph Noel des Quersonnieres was born on February 28, 1728, at Valenciennes, where his father was king's counselor. He became commissary-general of military supplies in 1789, and was in disgrace under the empire. He went to live at London, where he married. At the age of 117 he was still vigorous. His face is pleasant, says his biography, his hearing and sight have preserved an astonishing delicacy of perception, and his head is not entirely devoid of hair.—*La Nature.*

A CONNECTICUT CENTENARIAN.

It is not often that one sees a hale and hearty hundred-years-old man or woman, in the full possession of the normal faculties, and filling responsible positions in life, but such an opportunity was afforded in the case of the late Col. Perkins, who died at Norwich, Conn., September 5, and whose portrait we give herewith. Col. Perkins celebrated his 100th birthday on August 5, just one month preceding the date of his death, and at that time the New York *Tribune* and other papers, in noticing his long life, bore particular testimony to the remarkable preservation of his faculties.

Col. Perkins was a native of Norwich, but as a lad was rather weakly, although he was able, in his nineteenth year, to walk to Poughkeepsie to embark on the Clermont, the pioneer Hudson River steamer, when she made her first trip to New York. During the war of 1812–14 he was paymaster for Connecticut, Rhode Island, and Massachusetts. He was present at the battle of Stonington, and was aboard Commodore Decatur's fleet when it was blockaded at New London. He was one of the incorporators of the Norwich and Worcester Railroad, the second or third road of the kind built in the United States, and from 1838 until his death was its treasurer, continuing active in the performance of his duties until three or four weeks before his death, when he left town for a vacation. He had not

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missed an election in his town for seventy-six years Instead of being robbed of half his faculties in his old age, and so helpless from physical infirmity as to be a burden to his friends—as is often the case with those who are spared for so long a life—he engaged actively in business up to the last, a conspicuous figure in the streets, a regular attendant at church, and as well preserved and alert as many a man of sixty. It was his habit until recently to walk from his home to the company's office, over half a mile, four times daily, and he carried himself with an erect bearing, wrote a beautifully legible hand, and attended to his duties with an assiduity which many young men might copy with profit. His sight and hearing were excellent, and his only hobby is said to have been the art of preserving the health, a subject which he had carefully studied, with a benefit of which his great age affords the best attestation.

Thunder Storms.

Thunder storms at Brussels were much more common last June than for many years past. There is some evidence that since the erection of Melsen's complex and effective lightning conductor on the tower of the Hotel de Ville, they have not had nearly so many thunder storms in the city. But this tower commands the southwestern part of the city, and while thunder storms usually come from that direction, these come from the east.

The lightning flashes in some of these storms were extremely vivid. Several persons remarked in one of them that the rain drops were shining, and one observer saw the strokes followed by shining traces in the air, something like those which follow shooting stars. An interesting fact is that, in one case, at the instant of the stroke of wind which announced the advent of the storm, the flags which had been hanging loosely suddenly erected themselves toward the sky, thus showing in that case the presence of an ascending current in front of the storm.

M. Lancaster thinks that the following principles are true for Belgium thunder storms and, *mutatis mutandis*, for these storms generally:

1. The storms appear in connection with areas of low pressure, more generally when this area is from west to northwest of the locality occupied by the thunder storm. For Belgium, the electric phenomena attain their maximum when the focus of the general storm is over or near Ireland.

2. Thunder storms are most likely to occur when the barometer (reduced to sea level) stands at from 29·5 to 29 7 inches. In high pressures they are rare, local, and of little intensity. In Belgium they occur only in the mountainous part of the country.

3. The storms travel generally from southwest to northeast at a speed of 25 to 30 miles per hour. The rainfall accompanying them decreases toward the east.

4. Their production depends on the state of two important meteorological factors—pressure and temperature. A high temperature at the time of a barometric depression is the most favorable condition. The hour when they are most common is that which falls nearest to the thermometric maximum and barometric minimum.

5. A feeble gradient favors their production.—*Am. Met. Jour.*

Tobacco and Bacteria.

The popular belief in the germicidal virtues of tobacco smoke (which we note has been revived in connection with the alleged immunity enjoyed by the cigar makers of Florida during the recent yellow fever epidemic) has received some confirmation in the scientific researches of Dr. Vincenzo Tassinari, first assistant of the Hygienic Institute of Pisa University. In a preliminary note on his experiments (*Centralbl. f. Bakteriologie*, Bd. iv., No. 15) he describes the simple apparatus he designed to test the effect on pathogenic organisms of exposure to the fumes of tobacco. The apparatus consists in a chamber formed by two glass funnels placed horizontally, and connected together at their mouths by paraffin. In this chamber is suspended from a loop of platinum a small piece of linen, with the threads of its lower extremity immersed in a culture fluid containing the microbes. The chamber is connected at one end by a tube with a cigar or cigarette, and at the other by a tube containing a plug of cotton wool (to serve as a filter) with the mouth of the experimenter. The smoke as it is exhaled, therefore, thoroughly surrounds the linen soaked in the culture fluid, and after the experiment, which lasts from thirty to thirty-five minutes, involving the consumption of from three and a half to four and a half grammes of tobacco, the chamber is opened and the linen allowed to fall into a test tube containing fluid gelatine. Control experiments were also, of course, made. The micro-organisms subjected to this treatment included: 1. Spirillum choleræ asiaticæ. 2. Spirillum Finkler-Prior. 3. Bacillus anthracis. 4. Bacillus typho-abdominalis. 5. Bacillus pneumoniæ (Friedlander). 6. Staphylococcus pyogenes aureus. 7. Bacillus prodigiosus. The result varied with the variety of tobacco and the kind of microbe, but in every instance there was marked (sometimes very great) delay in the development of colonies in the gelatine as compared with that of organisms dealt with similarly, but without exposure to tobacco smoke. Indeed, the development of some was entirely prevented. For example, in the third series of experiments cited, where large Virginia cigars were used, the development of Bacillus prodigiosus was delayed for seventy-two hours, that of Staphylococcus pyrogenes aureus for seventy-three hours, of Bacillus anthracis for ninety-seven hours; while of the others, mentioned above, no development of colonies took place after from a hundred and twenty-eight to a hundred and sixty-eight hours. Dr. Tassinari attributes these results to the chemical action of the ingredients of tobacco smoke. He proposes to extend his researches more fully, both as regards the effect of different kinds of tobacco upon these and other micro-organisms, especially the tubercle bacillus, and to determine the time of exposure as well as the amount of tobacco necessary to produce the full effect. He hopes also to ascertain what substance or substances are responsible for the germicidal action.—*Lancet.*

Patent Car Bell.

U. S. Cir. Ct., S. D. N. Y., March 7, 1888. Mann's Boudoir Car Co. vs. Monarch Parlor Sleeping Car Co. Opinion by Coxe, J.

A patent for an improvement in compartment rail way cars, describing an arrangement of wire signal bells, or apparatus, to extend from each compartment to the porter's room, in view of the fact that such signals were in common use in hotels, on steamboats, and elsewhere prior to the grant of the letters patent, is void for want of novelty, and is not patentable. The patentee appears to have been the first to employ a wire signal bell to summon a servant in a railway car; but can it be that it required an exercise of the inventive faculties to do this, in view of the fact that the identical apparatus had previously been used for the identical purpose in dwelling houses, hotels, and steamboats? The additional fact should also be remembered that similar signal appliances had been used in horse cars and in railway cars. The only novel feature that can by the most liberal construction be discovered is the location of the apparatus in railway cars. The operation is the same. If it be invention to place a jingle bell in a passenger car, then each successive applicant who finds a new situation for such a bell is entitled to the rewards of an inventor. If this claim is held to be valid, with what consistency could a patent be refused to a person who, for the first time, should connect in a similar manner a row of bath houses at the seaside, or the boxes in a theater, or the tables in a restaurant? To remove a bell from the stateroom of a passenger steamer and place it in the stateroom of a passenger car requires no more of the inventive faculty than to take a steam whistle from a tug boat and place it on a woolen mill—no more than to place a doctor's speaking tube at the front door of a lawyer. The Supreme Court has over and over again decided that it was not invention to find a new place for an old device without change in the result or in the manner of operation. See cases cited in Electric Co. vs. Alarm Co., 33 Fed. Rep., 254. But even if the foregoing views are incorrect, it is quite clear, in view of the state of the art and the minute description of the specification, that the claim must be confined, to some extent at least, to the mechanism and arrangement disclosed. It would be a most unwarranted expansion of the claim to give it the broad construction contended for by the complainant, which would bring within its scope every mechanical contrivance by which the porter in a railway car is summoned by the passengers.

A New Aluminum Process.

Messrs. Brin Brothers, the inventors of the industrial process of separating the oxygen from the nitrogen of the atmosphere, recently showed some experiments in connection with a new process of making aluminum alloys, at their laboratory, 9 College Street, Belvedere Road, London. An ordinary, but rich, clay was mixed with a reducing agent called by the experimenters "a flux," and made into a paste with water. Some pig iron which had been run into bars three-eighths inch thick and two inches broad was broken into pieces. These pieces were charged with the paste and alternate layers of coke into a small cupola. A further quantity of coke to fill the furnace was put upon the top of the charge, and the blast from a fan turned on. In about twenty-five minutes the pig iron had melted. According to the inventors, nascent aluminum is produced in contact with the molten iron, and penetrates the same, the effect of the combination being to reduce the melting point of both metals and to yield a more fluid product than either of them separately. The contents of the furnace were then discharged into a ladle, and castings were made of the "aluminum steel" containing about 1·75 per cent of aluminum. The nature of the flux was not revealed, as Messrs. Brin have not yet completed all their patents, but the inventors state that its cost is not higher than that of the clay used. The castings were exceedingly sonorous, for when suspended by a string and struck with a piece of metal, the vibrations lasted from thirty to forty-five seconds. The castings were of white fracture, and free from blow holes. The silicon and some other impurities of cast iron are thrown out in the form of slag. The aluminum has thus a twofold function in this process. It forms definite alloys with the iron, and aids in clearing out its impurities.

In another experiment the ready manner in which aluminum can be reduced by the process was illustrated. A piece of thin, soft scrap iron was coated with the clay and flux, and inserted in a blowpipe flame. At a bright yellow heat the clay was reduced, and metallic aluminum became occluded in the whole thickness of the iron, giving the latter a white surface. The resulting metal, instead of being soft and pliable, became tough and springy, and it was claimed had acquired all the properties of first class steel. Some of the alloy thus made was put into strong, pure nitric acid, and was not acted upon thereby; while a piece of the original scrap iron was rapidly attacked under the same circumstances. The proportion of aluminum in the steel produced depends, within certain limits, upon the proportions employed of the original ingredients for charging the furnace. Alloys of copper and of some other metals can be formed in the same way. Some copper aluminum bronze was exhibited; also such a bronze alloyed with from 17 to 20 per cent of steel. This alloy can be made hard and with a fracture like fine cast steel; or by careful annealing and repeated rolling a fibrous texture can be produced. Mr. Frederick Varley, who has made experiments with Messrs. Brin's aluminum steel, states that it has all the properties of the best iron for conducting magnetism, while chilled castings will make excellent permanent magnets. He suggests the use of the bronze containing 20 per cent of aluminum as telephone and telegraph conductors, believing that the bimetallic character of the alloy will be found to be a corrective of self-induction. The principle of producing alloys by applying aluminous vapor in its nascent state is found to work with a long range of metals besides iron, and makes an exceedingly fine aluminum silver alloy, possessing valuable properties.—*Industries.*

American Freight Cars in England.

With the object of inaugurating a new industry at Barrow in the building of what are known as American freight cars, two of Goodfellow & Cushman's freight cars have been brought over from the United States in sections, and, after being built up at London, were taken to Barrow recently, where they were loaded and severely tested. These wagons are each 30 ft. long and will carry 30 tons. The frame is built of steel tubes, bound with steel struts. The car is supported at each end by a bogie, something similar to those seen under the carriages of the Midland Railway Company. The wheels, which are of cast steel, and of which there are four to each bogie, are cast in a block and without the usual tire. The carrying capacity of an ordinary English railway wagon is 10 tons, though the length of the wagon is just half that of the American freight car. One of the cars was loaded with 30 tons of steel rails and the other with about 27 tons of coal. Several trips were made to the steel works and in the goods yard, and the cars were found to answer admirably.

It is claimed for the Goodfellow & Cushman steel tube light-weight freight cars that a larger amount of goods could be carried than with the present wagons, and that there would be a saving of time, labor, and money, and it is urged by many who have studied the question that the English railways will before long be compelled to adopt some such wagon. One objection to these cars is that, although 30 ft. in length and capable of carrying 30 tons, their weight is only 10 tons, whereas an English wagon carrying a load of 10 tons weighs on an average about 6 tons. It is urged, on the other hand, that the car by its mode of construction is really a stronger wagon, though it is comparatively much lighter. Mr. H. Roberts, of the carriage and wagon department of the Midland Railway, at Bristol, is an advocate for the adoption of cars similar to those under notice. He says he does not advocate the destruction of existing stock if good, but thinks that all renewals of worn-out stock should be on the principle of greater length and greater carrying capacity.—*Colliery Guardian.*

Veneering Frame Houses.

A construction detail that is gaining much popularity in some Western cities is the bricking in of frame houses. The building is sided up with matched stuff, as if complete; then a brick face wall, four inches thick, is laid in contact with the exterior, tied on by spikes about every sixth course. A boy distributes them all around on top of the wall. They are held in the mortar bed ready, and driven through into the siding till the heads are flush with the face of the wall, when the next courses are laid, and so on. The walls present the appearance of solid masonry, are durable, and, as they add to the warmth of the buildings, seem to present substantial recommendations, especially in severe climates.—*American Builder.*

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Dosing Trees with Medicine.

Referring to the popular idea that sulphur placed in holes bored in the trunks of trees will be dissolved and carried by the sap to the foliage in such quantities as to render it offensive to insects, a recent *Bulletin* of the Massachusetts Agricultural College Experiment Station says that it has been found upon cutting down trees which have been plugged with sulphur that the material remains unchanged for many years. It is added, says *Garden and Forest*, that while we are spending so much effort to prevent injury to our trees from borers we certainly ought not to make holes in them many times larger than those made by any known species of insect. In order to ascertain whether sulphur in soluble form can be introduced into a tree so as to affect the fungus growths causing rusts, blights, and mildews, some large rose bushes, badly mildewed, were treated with saturated solutions of potassium sulphide, hydrogen sulphide, and ammonium sulphide. The liquid was forced into holes bored into the main stem with a small gimlet, and the orifice was plugged with grafting wax. At first a slight improvement in the amount of mildew upon the leaves was noticed, but in September all the bushes but one were dead, presumably from the effect of the holes. Until further trials are made, this experiment indicates that while there may be some promise that antiseptics introduced into the sap circulation may prevent the growth of fungi, some safer means of introducing the solutions must be found. From the nature of the case it is hardly possible that any substance can be introduced into the circulation in sufficient quantities to affect insect life. Professor Maynard, who prepared the *Bulletin*, suggests that an inspection be made next season of the elms in Boston which were bored and filled with chemicals last spring to make the leaves distasteful to beetles. Careful weighing would determine how much of the powder had escaped from the hole, and analysis could detect the presence of any excess of sulphur in the leaves.

Ancient Roman Plank Roads.

The Prussian Minister of Education, Von Gossler, having learned that Professor F. Knoke had lately found traces of old Roman plank roads on the moor between Mehrholz and Bragel, not far from Diepholz, in Lower Hanover, invited that gentleman to fully investigate the matter. He has just completed the task. He was able to trace the lines of two parallel plank roads right across the moor, presenting all those distinctive features which are found in Roman works of this kind. One of them shows evident signs of having been demolished by force, the boards, which were originally fastened with pegs to the bearers, having been violently torn away and buried in the bog to the right and left of the track. The other road seems to have fallen into decay, but there are signs of repairs executed even during the Roman period; for in places boards have been found fastened over the original planks, the fashion of both being the same. Those repairs seem to have been carried out hastily, for in one place a mallet, employed probably to drive home the pegs, was found on the track, forgotten, no doubt, by the workmen. The local archæologists feel assured that they have here the *pontes longi* which were used A. D. 15 by the Roman commander A. Cæcina in his retreat from Germany to the Ems.

AN IMPROVED ATTACHMENT FOR BICYCLES.

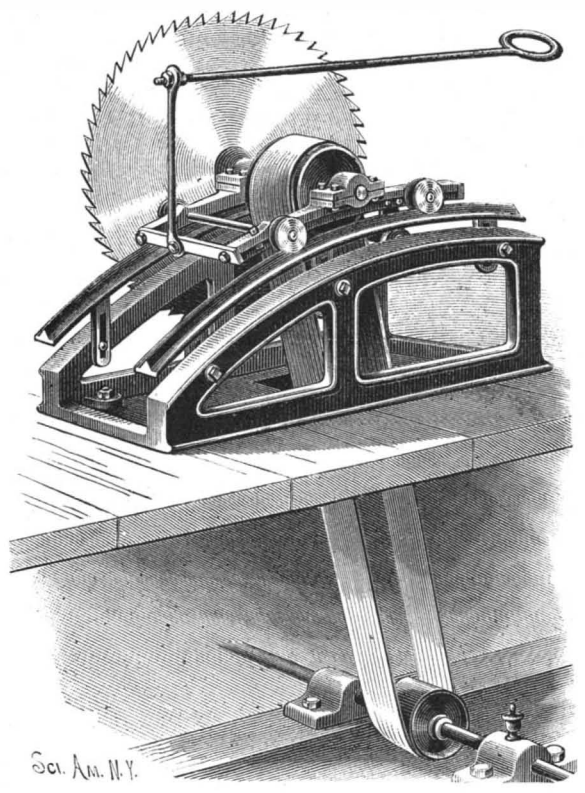
A simple and cheap attachment for bicycles or tricycles, whereby they may be run upon ice or snowy ground, is illustrated herewith, and has been patented by Mr. Herman H. Holtkamp, of New Knoxville, Ohio. A runner or shoe is arranged for connection with the small wheel of the vehicle, the shoe being attached by means of a clip on an adjustable bracket, whereby the runner may be used in connection with wheels of different diameters. To the large wheel are secured as many attachments as may be necessary, each of which consists of a cylindrical metallic plate, lined with leather or other slightly yielding material, and having flanges which extend outward from the side of the cylindrical section. This section is arranged so that it may be passed over the rubber tire and the felly of the large wheel, and on its inside are two projections extending toward the hub of the wheel, adapted to receive a clamping bolt, by which the attachment is clamped to the wheel. The two outward bottom flanges of this cylindrical section are placed at either side of the center of the tire, in order to allow for the regular operation of the ordinary form of bicycle brake, the small wheel being lashed to the backbone of the bicycle. With this attachment the vehicle may be freely used on ice, or heavily packed or frozen snow, while the attachment may be connected to or removed from the bicycle in a very short time. The whole combination, made of steel, may be sharpened for special feats on very smooth ice.

HOLTKAMP'S ATTACHMENT FOR BICYCLES.

A CHINESE teapot is of white porcelain embedded in a wadding lined bamboo basket, for retaining the heat.

CUT-OFF SAWING MACHINE.

We illustrate in the cut accompanying this article an ingenious mounting for a circular saw. It has been a usual practice when such saws are used for cutting off ends of timber or of boards, and for similar work, to mount them on an arbor at the lower end of a frame, swinging pendulum fashion from the beams of the ceiling of the shop. By the present invention all upper framework is dipensed with. The saw works on an



CUT-OFF SAWING MACHINE.

arbor, journaled on a carriage, that moves on a stationary frame or bed plate resting on the bench, working back and forth through the arc of the circle, being controlled in its reciprocations by the operator. The belt is driven from a pulley underneath the bench, the axis of whose countershaft coincides with the center of the arc or of the main frame. The rails on which the saw carriage moves are adjustable by bolts and slotted lugs. Their curve is also an arc of a circle, but in practice they are set slightly out of center with the driving pulley. As the saw is drawn forward it makes its cut. The rails, therefore, are so set that the belt is tightened as the saw comes forward and is slightly loosened as it recedes. Such loosening of the belt avoids wear of belt and journals. This receding motion is performed principally by gravity, so that the operator has little more to do than to pull the saw forward by its handle; the rest is practically automatic. Holding-down wheels are provided to prevent the carriage from lifting or rising from the rails. This machine is the invention of Messrs. J. W. Surprenant and J. E. Ferguson, of Astoria, Oregon.

The Qualities of a Good Rope.

In an article on rope making credited to a German periodical, but quoted in *Iron*, it is remarked that the appearance of a hemp rope affords to an experienced eye very fair indications of its quality. A good hemp rope is hard but pliant, yellowish or greenish gray in color, with a well defined silvery or pearly luster. A dark or blackish tint indicates that the hemp has suffered from fermentation while curing; and brown spots show that the rope was spun while the fibers were too damp, and is consequently weak and soft in the stained places. Sometimes a rope may be made up of inferior hemp on the inside, while upon this, as a core, good yarns are overlaid. This fraud may, however, be detected by unlaying a portion of the rope; and it generally betrays itself in use, if not otherwise discovered. Another variety of inferior rope is that made of short fibers, or the strands may be of unequal length or unevenly spun. In the first case the rope has a woolly or rough appearance, on account of the number of projecting ends of fibers; and in the latter case the irregularity in laying is easily perceived upon inspection by any one who knows what a good rope should look like. The combustion test for ascertaining the purity of manila rope has been published, but may be usefully repeated here. It consists in unraveling some of the fiber of the rope to be tested, and forming it into a loose ball, which is to be completely burnt upon a clean surface, such as an iron plate. Pure manila hemp burns to a dull grayish black ash; sisal leaves a whitish gray ash; combinations of manila and sisal show themselves by gradations of the grays.

Fortunes in Patents.

The Commissioner of Patents estimates that "from six to seven eighths of the entire manufacturing capital of the United States, or six hundred millions of dollars, is directly or indirectly based upon patents." A calculation of the same kind in England, according to our English contemporary, the London *Inventor*, reveals a still more surprising result, the capital invested being enormous. It has been computed that Siemens' inventions have produced more than five millions sterling.

"There is," says an eminent authority, "scarcely an article of human convenience or necessity in the market to-day that has not been the subject of a patent in whole or in part. The sale of every such article yields its inventor a profit. If we purchase a box of paper collars, a portion of the price goes to the inventor; if we buy a sewing machine, the chances are that we pay a royalty to as many as a dozen or fifteen inventors at once."

Lord Brougham often said that he would gladly have exchanged his honors and emoluments for the profits and renown of the inventor of the perambulator or sewing machine.

The writer here states the profits annually divided by our several sewing machine manufacturers, which are phenomenal in amount, adding that "more money has been, and always can be, made out of patented inventions than by any other investment or occupation." The telephone, the planing machine, and the rubber patents realized many millions, while the simple idea of heating the blast in iron smelting increased the wealth of the country by hundreds of millions. The patent for making the lower end of candles taper instead of parallel, so as to more easily fit the socket, made the present enormous business of a well known firm of London chandlers. The drive well was an idea of Colonel Green, whose troops, during the war, were in want of water. He conceived the notion of driving a two inch tube into the ground until water was reached, and then attaching a pump. This simple contrivance was patented, and the tens of thousands of farmers who have adopted it paid him a royalty until the recent decision of the Supreme Court, which was adverse to sustaining the patent. A large fortune was realized by the inventor who patented the idea of making umbrellas out of alpaca instead of gingham, and the patentee of the improved "paragon frame" (Samuel Fox) lately left by will £170,000 out of the profits of his invention. The weaving, dyeing, lace and ribbon making trades originated and depend for their existence upon ingenious machinery, the result of an infinity of inventive efforts. Carpet beating, from being an untold nuisance, has become a lucrative trade through the same inventive genius and mechanical contrivance. Even natural curiosity has been turned to account in the number of automatic boxes for the sale of goods of all kinds, and fabulous dividends have been paid by the public companies owning the patents. In fact, any one can be a successful inventor. In proof of this, the most profitable inventions are the improvements in simple devices, things of every day use that everybody wants, and which are in the power of everybody to invent. A lady derived a large income for inventing a moving belt for drying eggs, albumen, etc.

The Power of the Imagination.

We learn from the New Orleans *Picayune* that Dr. Durand, wishing to test the practical effect of mind disease, gave a hundred patients a dose of sweetened water. Fifteen minutes after, entering apparently in great excitement, he announced that he had by mistake given a powerful emetic, and preparations must be made accordingly. Eighty out of the hundred patients became thoroughly ill, and exhibited the usual result of an emetic. Twenty were unaffected. The curious part of it is that, with very few exceptions, the eighty "emeticized" subjects were men, while the strong-minded few who were not to be caught with chaff were women.

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Murder Culture by the Pictorial Art.

No fact is more patent to science than the direct effect of influences exerted through the medium of the senses upon the brain—that particular part of the organism whose functioning we call "mind." Darwin, Ruskin, and all the great students of development have labored to bring this fact within the cognizance of the general thinking public. That they have failed is only too painfully evidenced by the persistence and surprising ingenuity of the practice of cultivating homicidal propensities, and collaterally murder, by a refined use of the art of mural decoration.

While we empower the police to put down with a strong hand the exhibition in shop windows, and the censor of stage plays and spectacles to interdict the parade in theaters, of pictures and scenes of an "immoral" character, because it is recognized that these have a tendency to corrupt the mind of youth—and age too—nothing whatever is done to restrain the daily increasing evil of pictorial placards displayed on every hoarding, and of highly wrought scenes produced at nearly all the theaters, which not only direct the thoughts, but actively stir the passions, of the people in such way as to familiarize the average mind with murder in all its forms, and to break down that protective sense of "horror" which nature has given us, with the express purpose, doubtless, of opposing an obstacle to the evil influence of the exemplification of homicide. It cannot be disguised that even the most sensitive nature is to some extent brutalized by the display of these pictures.

We are none of us as shocked at the spectacle of a knife driven into the chest of a young woman, and do not recoil as violently from the idea of this form of murder, as before the display on all sides of an elaborate, nearly life size, picture of the deed. Nor do two men grappling together and stabbing each other, or one man shooting another with a revolver, strike us as presenting spectacles of such hideous enormity as they would have done had we not been familiarized with these scenes by impressive placards staring us in the face at every turn. It does seem strange—passing strange—that this murder culture by the educationary use of the pictorial art has not been checked by public authority.

We have no wish to make wild affirmations, but knowing what we do, as observers of development, we can have no hesitation in saying that the increasing frequency of horribly brutal outrages is by no means unaccountable. The viciously inclined are, in a sense, always weak-minded—that is to say, they are especially susceptible of influences moving them in the direction their passions incline them to take; and when the mind (or brain) is impressed through the senses, and particularly the sense of sight, in such manner as to produce mental pictures, either in waking thought or dreams, of homicide, the impulsive organism is, as it were, prepared for the performance of the deeds which form the subjects of the consciousness. We are, of course, writing technically, but the facts are indisputable, and we trust they will be sufficiently plain. It is high time that this ingenious and persistent murder culture should cease.—*Lancet.*

Whisky not an Antidote to Rattlesnake Poison.

Dr. A. T. Hudson, of Stockton, Cal., writes: "Having often seen the statement made in the public press, and sometimes in medical journals, that whisky and ammonia were the acknowledged antidotes to rattlesnake bite, I feel it a duty to administer a corrective to the above fallacious teaching. About thirty years ago Professor Weir Mitchell, of Philadelphia, spent over two years in carefully experimenting with the virus of snake poisons. Taking a few drops of the pure virus from the sac of the snake, he mixed it consecutively with alcohol, ammonia, iodine, bromine, mercury, and other reputed antidotes, then injected the solution of each into birds, rabbits, dogs, goats, and other animals—when he found that the poison was not altered in its power, but would produce its specific toxic effect just the same as when it was undiluted. He found also that the virus was fatal only to a certain extent, that is, if it took half a drop to kill an animal of thirty pounds weight, it would require one to two drops to kill one of sixty to eighty pounds. Its action is immediate, and it kills only when the animal is too small and weak in resistive vitality. It is rare that an adult person dies from the bite of a rattlesnake. The virus of the cobra is more intense and fatal. Several years ago a prominent minister in Philadelphia died from the bite of a young cobra. As a given quantity of the rattlesnake virus is necessary to overcome a certain amount of physical force, it is seldom that such quantity is ever deposited by the snake bite upon an adult person. If a large snake should bite a goat of fifty pounds weight, and soon after bite two children of about the same weight, the goat might die, but the children would not, for the reason that the goat would receive the largest amount of the virus, when there would be but little left to poison the children. In such a case, whisky being used on the children, their recovery would be attributed to the whisky; so the friends and neighbors would think they have positive proof of a sure antidote in whisky. Here is the fallacy which science alone can demonstrate. If, when whisky is mixed with the poison directly, it is no antidote, how can it become so when taken into the system remotely, the whisky in the stomach and the poison in the goat? Physiologically, whisky is antidotal so far as it will sustain the flagging powers during the time the poison is being eliminated by the excretory organs. In the light of the above scientific demonstrations, how a doctor can gravely or frantically proceed to treat a rattlesnake bite 'by injecting around the wound permanganate of potassa, or any supposed antidotes, or order a chicken split open and applied to the wound, or the anus of the chicken applied over the wound, using a number of different fowls for the purpose,' is a problem hard to understand in this age of reason."—*Medical Record.*

The Institution of Civil Engineers—Subjects for Papers, Session 1888-89.

The Council of the Institution of Civil Engineers, London, invites original communications on the subjects included in the following list, as well as on any other questions of professional interest:

1. The utilization of unused sources of power in nature—such as the tides, the radiant heat of the sun, etc.
2. Standard specifications for the materials used in the construction of engineering works.
3. The influence of sea water upon Portland cement mortar and concrete.
4. The construction, ventilation, and working of railway tunnels of great length.
5. Description of any new or peculiar type of mountain railway for very steep gradients.
6. Recent improvements in cable tramways.
7. The value, with respect to the safety and durability of metallic bridges, of (*a*) increase in the weight of the structure, by the choice of other than the lightest design; (*b*) increase in the dead load, by the adoption of a heavy description of flooring, with or without the addition of concrete or ballast.
8. The painting and preservation of metals, woods, etc.
9. Recent examples of hydraulic lift graving docks.
10. Forms and construction of masonry dams for reservoirs.
11. The cleaning and deepening of drainage and irrigation canals by mechanical means.
12. On the sale of water by measure.
13. Descriptions of mining machinery of improved design.
14. Gold quartz reduction and amalgamation—description of the various machines, and of their method of working.
15. The physical properties of metals under test.
16. The working strength of iron and steel as affected by (*a*) the amplitude, (*b*) the frequency, and (*c*) the time rate of the stress variations.
17. The present position of the manufacture of steel—its defects, and suggestions for its improvement.
18. The effect upon basic steel of (*a*) chromium, (*b*) aluminum, and (*c*) tungsten.
19. The properties of bronzes and other alloys.
20. Researches on the actual working limits of stress in machinery or structures under known conditions of variation of loading.
21. The corrosion of metal structures, and the best means of preserving them.
22. The effect of wind upon structures, as influenced by (*a*) their superficial area, (*b*) the form or position of the exposed surfaces, (*c*) the shelter of adjacent bodies, and (*d*) the dynamic action of sudden gusts.
23. On forging by hydraulic pressure, and casting under the same.
24. The construction of the working parts of steam engines, in relation to the high pressures and temperatures now becoming general.
25. The practical limit to the working pressure of steam in marine boilers.
26. The various systems of forced draught in boilers, with the economical results obtained.
27. The most recent types of (*a*) mail steamers, (*b*) cargo steamers, and (*c*) war ships.
28. On modern experience in screw propulsion, comprising the comparative efficiency of propellers of large diameter, and of smaller ones deeply immersed, and of the influence of form.
29. On the highest speeds attained and attainable on railways, having reference to gradients, curves, and the locomotives employed.
30. The application of the compound principle to locomotive and to portable engines.
31. Mechanical traction on common roads.
32. The petroleum engine and its applications.
33. The distribution of power by compressed air or by vacuum, and the construction of machines to be worked by compressed air or by vacuum.
34. Hydraulic rotative motors for high pressures.
35. The means of governing and economizing high pressure fluid in hydraulic cranes, engines, etc.
36. The construction and working of windmills, suitable for raising water for the supply of villages and isolated houses.
37. The best combined system of warming, ventilating, and lighting large buildings.
38. The transmission of steam underground in the United States, with the results obtained.
39. The plant used in the execution of important engineering works.
40. Tools used in the building of iron and steel ships, and in the construction of boilers.
41. The construction and working of friction brake dynamometers.
42. Steam cultivation by digging and by plowing.
43. The generation of alternating currents in dynamo electric machines, and their utilization for lighting and power purposes.
44. Electric meters for recording the consumption of electrical energy.
45. The construction and maintenance of secondary batteries.
46. Central station electric lighting.
47. The application of electricity to the working of street tramways and of railways.
48. The application of electricity to the working of cranes, pumps, tools, etc.
49. The application of electricity to smelting and metallurgical operations.
50. The application of electricity to the purification of water and of sewage.
51. The purification of copper, and the reduction of copper ores by electrolytic processes.
52. Contributions to the bibliography of special branches of engineering.

Electrical Notes.

Incandescence electrical lights are to take the place of the arc lights which have been used in the great Stampede tunnel on the Northern Pacific Railroad—the second largest in this country. The reasons for this change are interesting. The space to be lighted is, of course, in linear distance rather than in area, and the result, as might have been expected, was the intense illumination of some parts and the deep shade of others. Frequent readjustment was necessary because of the effect of the gases and smoke from the engines, the arc light apparatus corroded quickly, and the strong draughts ate the carbons voraciously.

The incandescence lights, being inclosed in bulbs, do not feel these draughts, and the metal bearings can be protected with gutta percha. The new system comprises a 300 light machine, running at a pressure of 200 volts, the lights being of the 30 candle power variety. The dynamo is worked by water power.

There was, as usual, much interesting discussion at the recent meeting of the American Institute of Electrical Engineers, but what was said as to electromotors may safely be put down as the most important. A practical motor man described the parts least perfect, explained where experimentation is most needed, and how necessary is careful work in construction, especially at the present stage of development. Mr. Sprague, projector of an overhead system of electrical railway, frankly described its drawbacks. "The trolley," he says, "is a clear source of trouble, and difficult to manage properly." Some time ago, when a telephone wire fell across the overhead main of the Richmond electrical railway, every wire touching it was melted, and if the current had not been cut off, "the destruction of the telephone exchange, and possibly the firing of the subscribers' instruments and houses," would have resulted. Mr. Sprague also enumerated the merits of this system, and it has many.

A TARDY DANGER ALARM AT SEA.

Among recent curious inventions is that of the automatic electrical sounding lead, coming from Mexico, and being one of the contrivances made by those of the land for the use of them at sea. It is designed to be put upon the ship's hull, with wire to electrical bell aboard. When the ship is shoaling her water, the bell rings.

New Swiss Patent Law.

The new patent law in Switzerland will come into force on the 15th of November.

Patents are granted for inventions not known in Switzerland, but citizens of those countries living beyond the sea which have joined the international union, of which the United States is one, can get patents there even if the invention is known in Switzerland or patented in the home country, provided they make application within seven months from the time of filing the application in the home country. Citizens of those countries not living beyond the sea have six months.

The patent is granted for 15 years, commencing from date of application. A small tax is payable annually during the life of the patent. The patent must be worked in three years. The law is somewhat similar to the French law.

We shall be pleased to furnish any of our readers who desire to take patents there, such additional information as they may desire.

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ENGINEERING INVENTIONS.

A station indicator has been patented by Messrs. Hans Helland and Franz Matzow. of Houston, Texas. This invention covers a novel construction and combination of parts in an apparatus to indicate to the passengers of railway or street cars when a car is approaching. standing at, or leaving a station, giving also the distances, and other desired data.

A car coupling has been patented by Mr. Samuel I. Fields, of Cherokee Nation, Indian Ter. Combined with the drawhead is a longitudinal pivoted locking bar having an outer hooked extremity, an angle lever being pivoted to the locking bar, and a spring-actuated link pivoted to the drawhead at one side of and parallel with the locking bar, the coupling being attachable to an ordinary link and pin drawhead.

A sweeper for railways has been patented by Mr. George P. Campbell, of New York City. Its construction is such that, with much snow over the track, an advance hinged mould board is lowered, where the bulk of the snow is thrown off, while the sweeper may be advanced from either end, the construction being strong and simple, and making a sweeper that can be conveniently and expeditiously handled.

AGRICULTURAL INVENTION.

A churn has been patented by Mr. Claus Duecker, of New Holstein, Wis. It is made with a rotary, barrel-shaped body, hung upon trunnions, the dasher being placed diagonally across the body, whereby the agitation of the cream is very effective, causing it to be churned to butter in a very short time.

MISCELLANEOUS INVENTIONS.

A frying pan or similar utensil forms the subject of a patent issued to Emma L. Farrell, of Brooklyn, N. Y. The invention consists of a frame in which a pan is held to revolve as desired, the frame of the pan being held stationary, and its body revolved over the fire.

A music holder has been patented by Mr. James E. Eastlack, of Philadelphia, Pa. It is independent of the rack on the instrument or music stand, and has a divided, broad, firm hold on the music, being designed to be carried in the pocket and be especially useful to players who have to perform from home.

A tail for kites has been patented by Messrs. Charles W. Burgess and William F. Fleharty, of Norwalk, Ohio. The invention consists of a disk held centrally on the tail rope and supported by guy ropes fastened to the tail rope and to the outer edge of the disk, making a tail which adjusts itself according to the velocity or pressure of the wind.

A screw-cutting die has been patented by Mr. James M. Carpenter, of Pawtucket, R. I. It has a vertical split at one side, a tapering hole parallel with the face of the die, with its walls in the meeting end formed by the split, and a tapering pin located in the tapering hole, making a simple means for expanding a screw-cutting die which requires only slight manipulation in making the adjustment.

An inhaling apparatus has been patented by Mr. Henrik C. F. Stormer, of Christiana, Norway. This invention combines a spray tube, with a lamp for causing a current of heated air, a receptacle for a medical solution, and an atomizer, whereby the solution, as sprayed, will have its liquid evaporated, and the dry particles only will be conveyed onward.

A nasal respirator has been patented by Mr. Joseph C. Locke, of Point St. Charles, Montreal, Canada. It consists of tapering tubular perforated shells, to conform to one's nostrils, and filled with fibrous air-filtering material, and is provided with fastening devices whereby it may be easily and securely applied and readily removed.

A postal date holder has been patented by Mr. Elias C. Walker, of Calmar, Iowa. The casing has two circular concentric series of type spaces, and a revoluble cover having two apertures corresponding with the type spaces, an auxiliary cover being adapted to close either one of its apertures, the device making a cheap and efficient holder for interchangeable dates.

A lock for bicycles has been patented by Messrs. Turney H. Gongware and Edwin K. Hanley, of Elmira, N. Y. It is a lock at all times attached to the bicycle in position for use, in such manner as to constitute an ornament, and is constructed so that, when the rider dismounts, he may apply a brake on the rubber tire and turn a key, keeping the brake in contact with the tire.

A toy race track has been patented by Mr. William N. McManus, of New York City. This invention provides a novel construction and mechanism designed to afford a simulation of a real race, in which a number of miniature figures will be carried about a circular race course, and after a number of times round will be projected forward by an impulse to the finish line.

A lifting jack has been patented by Messrs. Lawrence E. and Patrick Murphy, of St. Paul, Minn. The device is light in construction, with few and simple working parts, permitting of its being easily oiled, and is designed especially for railroad work, providing for an increased extent of movement of the lifting bar in response to the movement of the operating lever.

A machaine for sharpening and gumming saws has been patented by Mr. John Mealey, of Fairville, New Brunswick, Canada. It is for use on circular saws of all sizes, the construction allowing the saw to be placed at any desired angle in relation to the grinding wheel, and readily moved forward or backward, while both the sharpening and gumming can be rapidly and effectively performed.

A gate has been patented by Messrs. Andrew J. Powell and Marion G. De Crow, of Newark, Ohio. This invention covers a novel construction of tilting and swinging gates, designed to be cheap, durable. and efficient, for farm use, the gate being one which can be conveniently held in raised position or just sufficient to permit the passage of small stock, or swung on its hinges.

A fence post has been patented by Messrs. Silas J. Saxon and William H. James, of Colfax, Washington Ter. This invention relates to posts having a metallic foot piece to enter the ground, with a socket to receive and support the post, a thin metal tube being driven into the lower end of the wooden body of the post, and forming a light but strong extension thereof, making a durable attachment.

A combined clod crusher and roller has been patented by Mr. Oliver C. Look, of Collinsville, Ill. It has two or more rollers, so arranged by means of a flexible joint as to readily adapt themselves to the irregular surfaces of the ground, and the construction is such that the machine may be first used to crush the clods in a section of ground and afterward adapted to act as a roller to smooth and pack the same.

A window screen fixture has been patented by Mr. Edmund H. Ambler, of Beatrice, Neb. It consists of a set of disconnected and rabbeted bushing strips adapted to fit in the grooves in which the sashes slide, to adapt any window to receive a screen of the usual construction, which shall not interfere with the raising or lowering of the sash, but may be conveniently taken out and replaced for opening and closing the blinds.

A ticket printing apparatus has been patented by Mr. Gideon B. Massey, of Mamaroneck, N. Y. This invention covers a novel construction and arrangement of parts in an apparatus for the printing, dating, and consecutive numbering of tickets, and at the same time to preserve a record of the number of tickets sold from the point of sale to any given point upon the line, and also to preserve a record of each ticket as it is sold.

SCIENTIFIC AMERICAN BUILDING EDITION.

OCTOBER NUMBER.—(No. 36.)

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1. Elegant plate, in colors, of a suburban dwelling costing eight thousand five hundred dollars. Floor plans, sheet of details, etc.
2. Elegant plate, in colors, of two cottages costing twelve hundred and sixteen hundred dollars, respectively. Sheet of details, floor plans, etc.
3. A residence at Richmond Hill, N. Y., lately built, at a cost of ten thousand dollars. Perspective and floor plans.
4. A dwelling for three thousand five hundred dollars. Floor plans and perspective.
5. Villa at Fontainebleau—M. E. Brunnarius, architect. Cost, eight thousand six hundred dollars. Floor plans and perspective.
6. View of the new Protestant church at Lyons, France. Cost, eighty thousand dollars.
7. Page of engravings showing the house at Stratford-on-Avon in which Shakespeare was born—Anne Hathaway's cottage, near Stratford-on-Avon—Trinity Church, Stratford-on-Avon, where Shakespeare is buried—The residence of Mary Arden, the mother of Shakespeare—Old Elizabethan house, Stratford, showing the domestic architecture of the time of Shakespeare.
8. The chancel, Holy Trinity Church, Stratford-on Avon, showing the Shakespeare memorial bust and tablet, and the stained glass window, the gift of American visitors.
9. A suburban villa lately built at Sound View Hill, Long Island Sound, near New York. Perspective view and floor plans. Cost, five thousand eight hundred dollars.
10. Design for a cottage by S. W. Whittemore, architect, Brick Church, N. J. Perspective and floor plans. Cost, three thousand five hundred dollars.
11. A Queen Anne cottage in Rochelle Park, New Rochelle, N. Y., costing five thousand six hundred dollars. Plans and perspective.
12. An English double house of moderate cost. Perspective and floor plans.
13. Design for the Duquesne Club House, by Heins & La Farge, architects, New York.
14. Miscellaneous contents: A new regimental armory, New York City. — Ventilating pipes. — National Zoological Park.—Lime from oyster shells, showing pit for burning shells.—Roman road construction.—Beauty of the larch.—Sewage disposal in Great Britain.—Orchids, illustrated.—Test of fireproof wire lathing.—A clematis porch illustrated.—Some ways of using the Virginia creeper, illustrated with 3 figures.—Feeding coal to the fire.—Wood that will not blaze.—Fall of a stone church tower.—A ruined city in Texas.—Loofah as a substitute for sponge. — A California farm.—Defects in plumbing in the Maine Insane Asylum.—An improved reversible shaper, illustrated.—Improved hand and foot power saws, illustrated.—Practical hints on disinfection.

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Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Adopts the Sewall Car Heater.

The Sewall Safety Car Heater has been gaining ground rapidly of late, and has now been adopted by the Pullman Car Company, of Illinois. The following letter, giving this information, was received here Wednesday:

Chas. B. Strout, Secretary and Treasurer Sewall Safety Car Heating Co.:

Dear Sir—Yours of the 2d instant just to hand, and in reply would say: Our general superintendent wrote to the Sewall Car Heating Co. some time since commending their coupler fully; and I am authorized to say that the company, after using the three different couplers ordered, have adopted the Sewall coupler and are using it on all Pullman cars heated by steam.

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Canadian manufacturing firm want patented article to manufacture in Canada. One now being manufactured in United States preferred. Address G. H. A., P. O. box 773, New York.

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The Holly Manufacturing Co., of Lockport, N. Y., will send their pamphlet, describing water works machinery, and containing reports of tests, on application.

Lockwood's Dictionary of Terms used in the practice of Mechanical Engineering, embracing those current in the drawing office, pattern shop, foundry, fitting, turning, smith's and boiler shop, etc., comprising over 6,000 definitions. Edited by a foreman patternmaker. 1888. Price, $3.00. For sale by Munn & Co., 361 Broadway, New York.

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This is a volume of nearly 400 closely printed pages of alphabetically arranged lists of U. S. manufacturers of railroad materials and supplies, locomotive and car builders, telegraph and electrical materials and plant, and is calculated to be especially useful to those seeking trade in these lines.

MODERN SHOT GUNS. By W. W. Greener. New York: Cassell & Co. Pp. 192. Price $1.

This book gives a great variety of information such as sportsmen are generally asking of gunmakers—the essential differences between different kinds of barrels, coming from their methods of manufacture, explanations of many kinds of lock mechanism and how they practically work, particulars of leading types of modern shot guns, with numerous diagrams showing results of practice under given conditions, and full illustrations under each heading. The book will well repay the careful consideration of the scientific sportsman, and cannot fail to be of great value to the amateur at every step, from the purchase of his gun to the acquirement of a good degree of skill.

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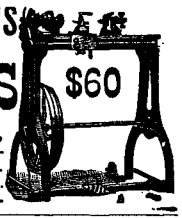

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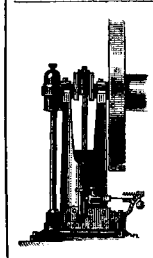
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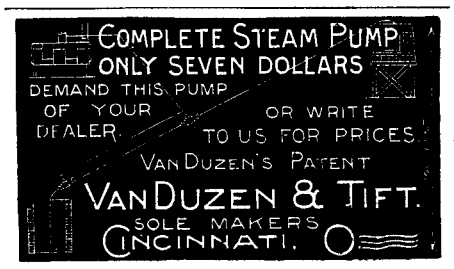

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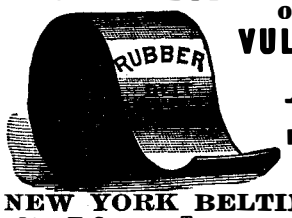

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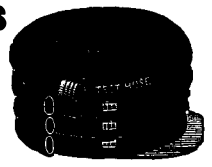

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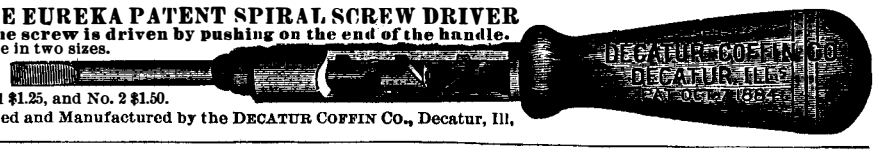

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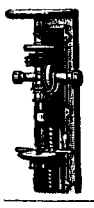

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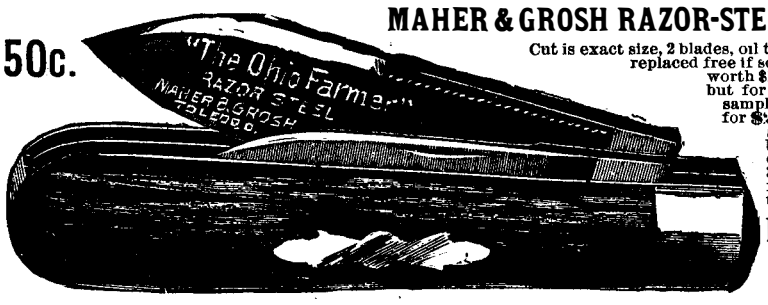

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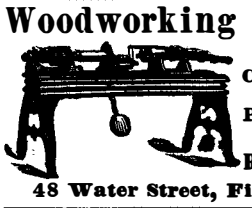

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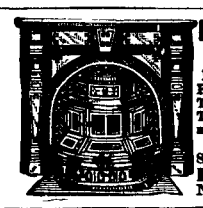

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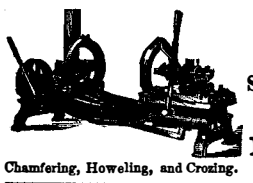

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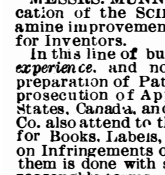

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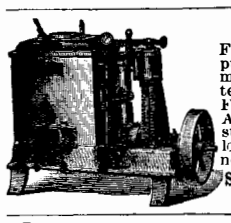

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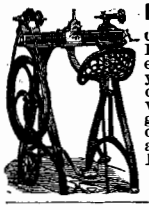

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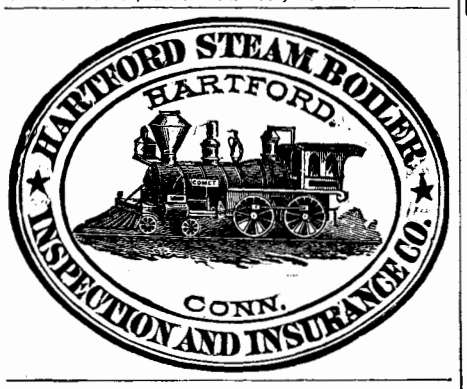

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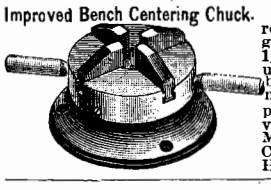

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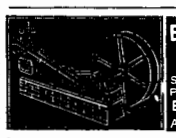

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